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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

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EDITORIAL NOTES—GAS, &c.

British Commercial Gas Association.

AFTER much labour, the representation for the Ordinary Committee of the British Commercial Gas Association has been completed; and from this Committee an Executive Committee has been elected. It has been a slow process to get the subscribing undertakings in the several districts to select their representatives, and so enable the administrative machinery to be perfected. But now this has been done; and elsewhere will be found the results of the elections, which present to us a compact and strong body to prosecute the educational and protective work for which the Association has been organized. The Association knits together, to serve the common objects in view, administrators of gas undertakings (company and municipal), engineers, secretaries, commercial gas men, together with the deputies of the Society of British Gas Industries. Indeed, there is not to-day an organization that, in the broadest sense of the word, represents the British gas industry so completely as the new Association. That the preliminary work of organization is over, is a matter for satisfaction; for now there should soon be more evidence of the existence of the organization, and of the exercise of the trust that a large part of the gas industry has reposed in it. An immense responsibility rests upon those who will direct the initial work of the Association. Upon what they now do along the untrodden paths rests absolutely the life or death of the organization. They have to make the gas industry feel, and maintain the feeling, that the newly-created body is a vital, and therefore an indispensable, part of itself. The present need of such an organization is largely agreed; and it is safe to predict that there will be greater need still for it in the future. The work will grow. Therefore the greater the importance of proving the efficiency, in dealing with present work, of the machinery that has been set up; for this will indicate its capacity to develop and shape itself to future requirements.

Activities of the South Metropolitan Company.

WHEN directorial policy is showing excellent material results in the accounts of a commercial enterprise, the chairman cannot but deem himself in happy case when appearing before the proprietors. That was the condition of Mr. Charles Carpenter when in the chair at the meeting of the South Metropolitan Gas Company last Wednesday. He literally revelled among the good things the half-year's accounts disclosed. He did not pass through the financial and working statements item by item; he took a few of the salient features separately, and used them to exhibit not only the strength of the Company's position, but how events have produced new problems, and how the solution of the new problems have metamorphosed both conditions and results. The past half year, as we have had occasion to point out more than once lately, has done more than any similar period (every half year will now progressively do this) to bring home the fact that, though the industry relies upon lighting for the backbone of its trading, the heating custom has now become so substantial a part of the business of a gas undertaking that atmospheric temperature is now one of the factors of prime importance in the matter of consumption. The facts in proof were pieced together by the Chairman in a few sentences. Though, through the abnormal temperatures ruling last half year, the Company had a decline of 2·45 per cent. in consumption, the whole year registered an output that has never been exceeded in any twelvemonth in the history of the concern. That alone is general proof; but descending to particulars, we get clearly accentuated the truth that the temperature factor in gas consumption is to-day something very real and very significant. Comparing outputs with the ruling temperatures day by day, it is found that the rise in consumption unfailingly synchronizes with the fall in temperature, and *vice versâ*. We have a notable instance of this in the Chairman's statement that, in some cases in the mild days in the latter part of December, the gas consumption fell off by 10 per cent. during the daylight hours, while in the colder days of the later part of January and the beginning of February this year, increases of 28 and 29 per cent. were recorded. This being so, it is plain that we must anticipate even more erratic consumption figures than in times past, when abnormal spells of cold or hot weather are experienced. This will be more and more emphasized as gas heating extends in favour; but the innate conditions of the industry enable it to encounter variations of the kind without much perturbation. The public is recognizing that, in this ability to meet demand, without menacing reliability, and without at times "letting-" down" and inconveniencing consumers, the gas industry possesses an asset of an importance that cannot be claimed by its principal competitor.

That the industry, in habiting itself in new conditions, is materially increasing its resources in other directions was shown by the Chairman. In residuals, gas undertakings have also a "tower of strength;" and recent returns from them have been moving up in luxuriant fashion. Circumstances have been remarkably good to the industry. Mr. Carpenter does not put the better returns down to demand alone, but to an improvement in the intrinsic value of the residuals. It has to be confessed, now that we know better how to carbonize coal for the purposes of the gas industry, that high temperature carbonization, under the system of light charges and much exposed highly heated retort surfaces, did serve to degrade the residual products as well as the gas. Though the Company last half year made an average of 12,392 cubic feet of gas per ton of coal, they are concurrently obtaining more valuable liquid products, and less of the less valuable ones. The benzol, for instance, in the tar is now from two to three times as much as it was ten years ago; while, on the other hand, the production of pitch is not so high. These are points of considerable and permanent value in weighing-up the *pros* and *cons* of the newer system of carbonizing in horizontal retorts, which is the system on which the Company are making extensions and reconstructions of plant, through the Company's Chairman and technical officials not having yet been enslaved by vertical retort operation and results. From these experiences, it is clear that the manufacturing counsellors of the Company—whatever the nature of the still open view existing elsewhere—have fully satisfied themselves as to the close and stable relationship of high gas make and improved value in residual products. Mentioning high make, it is almost a startling piece of evidence as to the economy that modern practices have achieved over their predecessors, when we hear that, if the make per ton had remained in 1911 on the scale of 1901, the output last year would have required the purchase, conveyance, and handling of approximately a further ¼ million tons of coal. This is a fact of not only great technical and commercial significance, but it is one that should interest those who indiscriminately bond the industries of the country together in making the charge of wasteful consumption. We know the charge is not universally applicable; we know that above all others the gas industry can claim to realize the largest value in direct product from the coal it uses, and therefore it is the industry that can claim the largest economy in the use of coal.

One other important announcement fell from the chair in connection with manufacture. The temporary reversion to partial lime purification by the Company looks like approaching its end. Our readers have been informed that the Company have been experimenting on the large scale with a new system of dealing with the sulphur compounds. They have been attacking the problem, to use the Chairman's phrases, more thoroughly and systematically than before, in the light of greater chemical and physical knowledge of the subject. The trial that has been made of the new plant has been

equal to one-twentyfifth of the Company's make of gas; and now a plant is to be put up at the Old Kent Road works that will be equal to from 7 to 8 million cubic feet per day. This will be run under ordinary working conditions, in the hands of the men, without the same close attention that the first trial plant has had from its originators. But we read into the extensive scale plant that is going in at the Old Kent Road, a substantial confidence as to its issue in performing the functions for which it has been designed. Rewarded by all that is hoped from it, the Company will then in 1913 put the whole of the gas produced under the system. This is an important announcement. If only it relieves the gas industry from the necessity of the use of lime where an excess of sulphur compounds is produced, and proves itself to be an economical process, the industry will again have to acknowledge its indebtedness to the Company.

Looking at these matters and others to which the Chairman referred, there is all the evidence of great originating activity in the Company on many lines—all aiming at development in one way or another. It is seen not only in connection with manufacture, but with the applications of gas. In passing, it may be mentioned that the Company now claim large representation with high-pressure lighting in all the important shopping centres in South London. In several of these areas, the high-pressure lighting is a striking spectacle during the evening time. The "Metro" burner—which the Company's staff has developed, is gaining in popularity among the consumers; there being already between 13,000 and 14,000 of them in use. Small wonder at this. Consumers prefer to be put to as little trouble as possible in cleaning their burners. With the "Metro" there is no regulator (it being specially nippled for the gas supply of the district), the globe is supported without screws or springs, the burner itself is connected to the gas-fitting by a bayonet joint, and the head of the burner is made of porcelain, What these points mean to the lay consumer need no underlining to emphasize them. The Company are doing their utmost to gain knowledge as to what consumers require, and to use that knowledge as the base for development in their experimental workshops and laboratories, which incidentally the Chairman mentioned have been extended for the purpose of working at fresh inventions. At the present time, in their experimental workshops, problems that are engaging attention are the more economical use of gas for cooking and heating. We get good efficiencies now in these directions; but, in an industry subject to so much competition, we are catholic enough, and mindful of the best and common interests of the industry, to wish good speed to all such effort. Would that there was similar enterprise, with the object of breaking fresh ground in developing the economies and efficiences of gas appliances, proceeding in many more of the larger works, so as to bring more brains, thought, and effort to bear upon these problems. It might not all be at once productive; but at all events we are sanguine that it would not be barren of some good.

These matters are of considerable importance; they are matters that perpetually weigh in industrial and commercial prosperity. More general topics were treated upon in the speech—coal supply, the Insurance Act, and co-partnership among others—but the activities of the large concern in South London have about them an individuality that claims special notice in these, to the gas industry, highly interesting and progressive times.

One More Coalite Flutter.

One more flutter, and all should be over with the British Coalite Company. The sore and much-wearied shareholders have received circulars which inform them that the financial position of the concern is so critical that an entirely fresh departure is necessary if the assets, such as they are, are to be preserved. This is perfectly frank; and those of the shareholders who have clung to the shreds of hope that have been scattered among them of late years must now surely come to the conclusion that they have been the victims of false appearances with which the coalite process was originally glorified at the hands of the promoters. The shareholders' money has been frittered away in various directions; one being in proving that the critics of the "enterprise" were right, and the garish advertisements of the promoters were decidedly wrong. A subscribed capital of £720,000 (not taking into the reckoning the £500,000 of deferred shares issued to the vendors) has been sunk in fruitless endeavour; and all that remains is the Barking site, on which stands plant, the carbonizing part of which certain enthusiasts want to reconstruct. Money enough has been spent on this particular chimera. But the enthusiasts want to spend more; and so they present to the shareholders of the Company a scheme for the formation of a concern to be called the Eticoal Syndicate, Limited, with a capital of £30,000, of which £15,000 it is proposed shall be at once issued. To this concern the shorn British coalite shareholders are asked to subscribe. It is either this, or allow the debenture holders to enter into possession, and get what they can for the Barking site, for we do not know of anything else properly describable as assets.

The circulars state that the Syndicate has been formed to meet the pressing financial difficulties which stand in the way of establishing the commercial value of the process for the manufacture of coalite. In other words, the position to-day is that which preceded the coalite promotions; for all that has been done has not established anything but failure and waste. What present enthusiasts think of the past management of the concern, and of the work done at great cost, is summed-up in the statement that "recent operations "at Barking leave little doubt that, with a properly con-"structed plant [with 'fireclay batteries'], and with efficient "management, the manufacture and sale of coalite can be "conducted on a commercial scale, and at a good profit." Therefore, their view is that what has not been done with nearly three-quarters of a million can now be accomplished for a few thousand pounds. This is something for the shareholders of the British Coalite Company to ponder over. They are wiser now than when they put their money into coalite, and when they cheered the statements that were glibly made at their earlier meetings as to the wealth that was in store for them. The mocking echoes of those cheers have not completely disappeared from the ears of the shareholders, who will now require strong persuasion to make them believe that they will find in the promises held out by the Eticoal Syndicate, Limited, a lenitive for disappointments and material losses.

Purchase Valuations and Profits.

Now that the award has been published in the arbitration case in which the Margam District Council are the purchasers and the Aberavon Corporation the reluctant sellers of part of a gas undertaking, there is a point—a new point—arising from it upon which we may make a few observations. It is a matter that, as Mr. Honoratus Lloyd, K.C. (who appeared for Margam), put it, is one of the utmost importance to the whole gas industry; and there was recognition of it too in the manner in which Mr. Balfour Browne, K.C., handled it on behalf of the selling Aberavon authority. Important as we recognize the point to be now that it has been raised, we cannot compliment anyone who appeared for Margam upon putting forward a contention so utterly devoid of equity, nor upon the vigour shown in attempting to utilize it to obtain for Margam something at a price that the Arbitrators, Mr. Corbet Woodall and Mr. H. E. Jones (with Mr. A. J. Ram, K.C., as Umpire), have said was less than one-third of the price that Margam must pay to Aberavon. With a valuation of £9441 seriously put forward for Margam, we see a distinct rebuff in the award of £30,840, which wholly rejects the contention.

What was attempted was the introduction of a new principle in valuations for purchase in view of what has been done in Parliament in the matter of the restriction of profit appropriation in aid of the rates. It was contended that the trend of legislation being in the direction of limiting the amount of profits that may be transferred for dissipation on local purposes altogether distinct from the gas undertaking, or of entirely refusing to allow profit appropriation for external purposes, the maintainable profits were threatened; and that, in valuing for the purpose of purchase, this risk should be taken into account and allowed for. If success had attended the attempt to establish such a principle, then equity would demand that there should be a revision of the basis of valuation in these cases; for it is the last thing that Parliament would desire or sanction, in authorizing expropriation, that a fair price should not be paid for the undertakings. We are prepared to submit that, whether or not the profits of a municipal concern are limited, this makes no real difference to the value of the undertaking to a community. By restricting the amount of appropriable profit, the value of the property is not diminished one iota in its capacity for service to the community—in fact, from our

point of view, it is increased, through the margin of profit that is made, instead of being dissipated in other directions, being devoted to the building-up of a reserve for the benefit of the undertaking, in maintaining the gas-works and plant generally, or in reducing to the community the cost of the service rendered. In other words, we see no destruction of value by a local authority gas undertaking supplying the community at a low price sufficient to meet all their obligations, instead of at a high price, and scattering extra profits among the community at large. However one examines the matter, the value remains in the undertaking whether or not profit appropriation in aid of the rates is allowed by Parliament. Do, for example, Glasgow or Stoke-on-Trent look upon their gas undertakings as being in anywise of less value because they are not allowed to extract from them profits in aid of the rates? Not a bit of it. There are local bodies, too, with gas undertakings who, though they are not prohibited from appropriating balances in aid of the rates, prefer to apply the greater part of any margins to reductions in price. Do they, in consequence, regard their undertakings as being one whit less valuable? Not a bit of it. Do they really depreciate the value of their property by so doing? Not a bit of it. The rendering of better and cheaper service through the undertaking is regarded by some people—ourselves among the number—as being of greater importance and value than making money for people who have never been called upon to contribute one pennypiece towards the concern, and who, if they had, in common fairness, ought to have provision made for repayment.

Our point of view may not be the same as those of the claimant parties who urged the recognition of this new and monstrous principle. But now that it has been put forward, it will have to be legislated for as occasion arises, in order that injustice may not be inflicted. There have been strange happenings in Parliament; but Parliament, at its worst, has never contemplated any (we will purposely put it bluntly) such shameless form of robbery as was contemplated here. If the suggested principle were established, we can hardly tell where it would end in connection with the purchase of parts of local authority undertakings or the acquisition of company concerns. In the latter case, the purchasing local authority would submit, as affecting the value of the concern to them, the disability that Parliament had placed upon them in respect of making profits for allocation to the relief of the rates. Owners of property have rights, and those rights ought to be respected, and not be subjected to something for which it is difficult to find an adequately appropriate name.

The Carbon Dioxide Bogey.

We recommend the members of the Electricity Publicity Committee and electricians generally who actively spread abroad false information regarding the carbon dioxide produced by the combustion of gas to read an article by Sir Ray Lankester, K.C.B., F.R.S., that appeared in the "Daily "Telegraph" yesterday week, on "Fresh Air and Ventila-"tion." In it he particularly dealt with the false impressions that exist as to the effects on human beings of carbon dioxide in the atmosphere. What the writer of the article has to say has long been common knowledge in the gas industry; and perhaps, if intelligence comes to their aid, our electrical friends will see reason to accept Sir Ray Lankester's authoritative statements, and cease from foolishly running into the danger to which they are exposing themselves by, in attempting to injure the business of the gas industry, labelling carbon dioxide "poisonous." In one of the leaflets in our possession, issued by the Electricity Publicity Committee, and largely circulated, the words appear: "Gas "yields carbon dioxide (*poisonous*)." There is no excuse for the Committee, nor any who patronizes their productions, publishing the slander that the circular contains. They have had warning enough. Authority after authority has been quoted, and now comes Sir Ray Lankester. Perhaps electricians will see that prudence calls upon them to mend their ways in this particular.

The electricians have been relying on, and taking refuge behind, old notions. Sir Ray warns all and sundry to be on the alert to ensure that explanations as to the how and why furnished by text-books and popular teachers really keep pace with advancing knowledge, and that they are really sound and trustworthy, and capable of standing the test of varied experience. That is just where the electricians are in fault. They have in this matter relied upon the mistaken beliefs found buried in ancient and musty books, ignoring altogether the new knowledge derived from, and teachings of, latter-day scientific investigation. They have been doing this through ignorance, or because the old theories, since rejected by science, suited their calumniating purposes better than the new and more reliable knowledge. What does Sir Ray say on the subject: "The notion that we must open the window "and let in fresh air, because a small percentage of carbonic "acid gas is, if not poisonous, at any rate injurious, has "been abandoned. Thirty years ago, it was believed that "even as little as $\frac{1}{5}$ per cent. of carbonic acid gas in the "inspired air produced injurious results, and should be "avoided. *That is now known to be an erroneous conclusion.* "There are other reasons for attaching value to good venti-"lation, and other explanations for our love of fresh air, "than that which consists in making *a bogey of carbonic acid* "*gas.*" If in this electricians cannot see ridicule of their pretensions and slanders, as well as danger to themselves by persistence in the latter, then they must be dullards, and they must take the consequences of being so.

There is another point. We have often protested against the absurd restriction of carbonic acid in factory air to only 12 parts in 10,000. This is merely the survival of an old prescript based upon the ancient misconception. Compare this singular restriction with what Sir Ray Lankester says: "Man can tolerate one part of carbonic acid in 100 of the "air he inspires with indifference; it does him no harm what-"ever, and is negligible, except during muscular exertion. ". . . In rest or sleep, man is actually indifferent to, and "in no way injuriously affected by, as much as 2 or even 3 "per cent. of carbonic acid in the inspired air." Therefore, while the factory rule is only 12 parts in 10,000, Sir Ray says that man can tolerate 100 parts in 10,000 parts with indifference. That is what 1 per cent. means. With such facts before them, publicly certified by Sir Ray Lankester, are the members of the Electricity Publicity Committee prepared to take the responsibility of being the vehicles for the continued circulation of a gross untruth? If they are men of honour, and have all this time been ignorantly making a mistake, they will now do the correct thing, and withdraw the slander, which during its whole existence has been discreditable to the authors.

Depreciation Allowance for Income-Tax.

Since the article, entitled "Suggested Settlement of Depreciation Allowance," appeared in our issue of last week, it has come to our knowledge that an influential Committee representative of a number of large and important Gas Companies has been sitting for some time to consider the question of depreciation and income-tax; and we believe the Committee intends shortly to approach the Special Commissioners (if this has not already been done) to lay before them a proposal for the settlement of this vexed question.

On Selecting a Manager.

There are, of course, different methods of filling an appointment—some of which will be more likely than others to commend themselves to the possible applicants. One which cannot fairly be expected to prove acceptable to those offering their services, has lately been adopted by a Gas Company in Scotland. The Company in question were desirous of securing a manager; and to guide intending applicants, a "Memorandum as to Duties and Remuneration" was prepared. Among other things, this embraced the following statement: "The manager has the entire charge of the works, and the supervision and payment of workmen. He attends to all matters connected with the manufacture and sale of the gas, and is responsible for the keeping of the expenditure, wages, and other books connected therewith. The accounts to be paid are submitted to the Board at their monthly meeting. The collector attends to the ingathering of accounts due by customers, and the receipts from the slot-meters. There is a show-room and office, of which the collector and clerk take charge. The salary is £300 a year, with a free house, coal, and gas; and the rates and taxes are also paid by the Company. Applicants are requested to state fully their experience, qualifications, and present salary." The request for particulars as to experience and qualifications is a necessary one for the making of a proper selection from the candidates; but the reason for the wish to know the "present salary" of applicants is not so obvious. However, on the face of it, the memorandum is clear,

and sets forth the position of affairs in such a manner as to easily enable those who might peruse it to decide whether or not they should apply for the position. Had, therefore, the matter remained there, all would have been well. But it did not. Applications having been sent in, it seems that some of the candidates, at least, were asked to state by return whether their application would stand "in the event of the Board resolving to reduce the remuneration to £250 as a commencing salary—with house, coal, gas, and rates." No enlightenment was vouchsafed as to why an alteration of the definite offer of £300 previously made should have been contemplated; and we are not going to search about for a reason. But in the absence of a satisfactory explanation on the part of those responsible, applicants might surely be pardoned if they viewed with disfavour so sudden a depreciation in the value in the Company's eyes of the services which they are desirous should be rendered to them.

The Crisis.

The gravity of the position in connection with the coal crisis was intensified during the past week. The positions occupied by masters and men are so diametrically opposed that there seems no possibility of compromise without a complete surrender by one side or the other. This there appears no intention of doing; and, in face of this position, all such machinery as the Industrial Council and Conciliation and Arbitration Boards appears quite impotent. This test of ability to rise to such an occasion as this, and to do good work, is the most crucial one that is likely to confront them; but just when most wanted, they so far find themselves powerless. There is talk of the Government intervening. The Government may intervene; but it still remains with the parties to the dispute to allow the intervention to have any good effect. The Government have no compulsory powers in a matter of this kind. There is also talk of a "secret committee" sitting negotiating privately with the parties. Rumour also says that the miners are averse to any Government intervention until they know whether the miners of Germany and France will throw in their weight with them by striking simultaneously. Point is also made of the fact that the reserve funds of the Miners' Unions within sight only average £2 3s. 4d. per man, so that a prolonged strike would be impossible. But from these various reports, no guiding light can be extracted; and the bare fact stands out prominently that we are on the brink of a national catastrophe.

If a Fight is Inevitable.

Reports continue to come in of gas undertakings being well prepared with stocks; and most other industries have piled stock into their available spaces. This preparedness affects consideration of the position. In quarters well able to study the predominant feeling of the men, the view is held that sooner or later there must be a strike—that nothing will bring any duration of peace but an absolute outbreak. If this is so—if a fight is inevitable sooner or later—much as we all profoundly deplore such war, then the time of the year and the conditions of the principal consumers of coal, are now as good as any for meeting such a disaster. The persistent upheavals and threatenings that there have been for some time past in the coal-fields keep the country in a continual state of torment; and it might be anticipated that, after a storm, there would be a fairly lengthy calm. Far be it from us to advocate a fight with all its horrors and waste. But if a fight is inevitable, then better now for the country than maybe at a less propitious time. Peace, and permanent peace, we must all desire. How is it to be obtained? Some coalowners have given notice to their customers that, after this week, they cannot make any promises as to deliveries.

Points from Croydon.

The Suburban Gas Companies did well during the past half year. The Croydon Company is typical. Despite the severe competition of a much-favoured municipal electricity department, and a reduction in the price of gas of 2d., the earnings of the Company last half year show a good surplus; and there was an increase in the consumption of gas of 3·71 per cent. Mr. Charles Hussey, J.P., the Chairman of the Company, had besides the foregoing many good points to lay before the proprietors. Among others, it is learned that on the cold Monday a fortnight or so since, a day's record consumption was established—being 27 per cent. higher than the corresponding day of 1911, and upwards of 50 per cent. more than on the corresponding day of 1910. The demand for gaseous fuel is responsible for this. Mr. Hussey is an ardent believer in all joint action in an industry the units of which have so much in common; and he pressed the claims of the Sulphate of Ammonia Committee upon those producers of the commodity who do not subscribe to the propaganda work of this body. The Croydon manufacturing results of the half year were on the high scale; and in this respect, as in connection with the commercial department, the Chairman distributed praise where it was justly due. Among his references to the coal trouble, he had some criticism to pass on the railway companies for taking so long in restoring normal goods traffic after the railway strike of last summer. This has made considerably harder the lot in the present crisis of those undertakings dependent on overland transport from the coal-fields. There were two absentees from the meeting on Friday, as mentioned in our "Personal" notes. The cause is a matter of the deepest regret to all the friends of Mr. Corbet Woodall and Mr. James W. Helps.

Exhibitions.

The Council of the British Electrical and Allied Manufacturers' Association are recommending their members who are specially interested to support the forthcoming Smoke Abatement Exhibition in London. It is considered by the Association that they cannot afford to neglect such a display in view of the activity of the gas industry and the public interest in the subject of smoke abatement. At the same time, the Council have had to use some discrimination in the matter of the exhibitions they recommend for support, in view of the fact that manufacturers are almost submerged with applications for all sorts of schemes, and have in the past spent much time and money without adequate return. But they do not discountenance large and creditable undertakings, promoted by the electricity supply authorities. Naturally, when the expenses are spread over both the parties who benefit from exhibitions—the supply authorities and manufacturers of the appliances—it lightens the cost to the latter, and makes them look more generously upon the proposals submitted to them.

Municipal Dread of Parliament.

It seems to be a commonly accepted belief in municipal circles that gas-profit appropriation runs less chance of injury at the hands of the Local Government Board than at those of Parliament. We have seen the Salford Corporation trying to get the powers they require for the Gas Department by flying from Parliament to the Local Government Board; and there was another illustration in the Darwen inquiry for a loan, in regard to which a report appeared last week. It will be remembered that Mr. Thomas Duxbury opposed the granting of the additional loan. He first raised the question as to whether the Local Government Board had power to grant it—submitting that, the Corporation having exhausted their gas borrowing powers, they should go to Parliament. On the other hand, if the Board had power to grant the loan, he held that it should be accompanied by a condition that no more profits should be appropriated in aid of the rates. The Town Clerk's reply showed the direction in which the confidence of the Corporation lies in the matter of the preservation of profit-appropriation. He said Mr. Duxbury wanted the Corporation to go to Parliament because there would be a better chance of striking out the profit-appropriation powers under the old Acts; and the Council were not desirous that the powers should be abrogated. This, next to the action in the case of Salford, is about as clear a confession as has been made, that the municipal authorities of the country entertain a genuine fear of Parliament curtailing their indulgence in profit appropriation.

Electrolysis of Underground Pipes.

In this issue, there is concluded the instructive paper, by Messrs. E. B. Rosa and Burton M'Collum, that was presented at the meeting of the American Gas Institute, on "Electrolysis in Underground Pipes." In this country, fortunately, we have not suffered so much from the destructive work on subterranean pipes of vagrant electric currents as pipeowners appear to have done in America. At the same time, there is not complete assurance of immunity. Therefore, the information supplied by research is useful, and should be placed on record. The paper before us does not pretend to exhaust consideration of all the factors bearing upon the question of minimizing the trouble. It treats almost

exclusively of the advantages of insulation; and this matter again is subject to further investigation. But so far as the inquiry has gone, insulation, studiously carried out, is proved to be effective in diminishing injury from stray electric current. But the authors of the paper are careful to point out that they are not yet prepared to say that insulation is the best method to adopt. If applied, however, for the purpose of minimizing injury, care must be exercised; and study must be made of conditions and surroundings. Insulating joints are much favoured by the authors; but the best ones to use, under certain circumstances, have to be considered. Their frequency and location are also matters that must not be overlooked. If these and such-like matters are not thoroughly taken into account, a heavy expenditure may be incurred without securing much of the desired effect. What is wanted is the maximum of protection at a minimum of cost; and this Messrs. Rosa and M'Collum assist the engineer in securing through their researches. Insulating paints are not looked upon by them with very great favour, though useful for mitigating soil corrosion. The embedding of pipes in cement for protection against electrolysis is regarded as a useless expense; but insulating joints (properly applied) are certified by those with experience as effective, economical, and entirely practical from the mechanical standpoint. The conditions of use, and the discussion of relative suitability, are matters to which the authors devote much of their instructive paper.

High-Pressure Transmission.

The transmission of gas by high-pressures is a never-failing source of interest in technical gas circles at the present time; and, while it is a growing practice, the experiences and details from and of actual work will serve a useful end. The Grimsby Gas Company (the Engineer and Manager of which is Mr. John Terrace) have had to make provision for the supply of Immingham, which place, through its splendid new dock, has recently risen into importance. It is situated about six miles from Grimsby; and the problems relating to its supply were whether it would be better to put up a small gas-works there, or use the method of high-pressure transmission, with its large elasticity in the matter of delivery. From a paper by Mr. John Kennington, read before the Yorkshire Junior Gas Association on Saturday, it is seen that the latter system easily carried the day from the points of view of economy, management, and the serviceableness of the system by branchings from the main pipe-line for other purposes than the capital one of supplying Immingham. The compressing plant is of the Bryan Donkin type; and 6-inch Mannesmann tubes are employed. The details are set out clearly and fully in the paper, which serves to illustrate the ability of the high-pressure system to assist in the roping-in of outlying areas.

Certified Compensation Schemes.

An interesting point was decided by the Court of Appeal some days ago, in an appeal from a decision of the Judge of the Portsmouth County Court, sitting as arbitrator under the Workmen's Compensation Act, 1906. The applicant was in the employ of the Admiralty, who relied, in defence, on the facts that a scheme of compensation for their men had been duly certified by the Registrar of Friendly Societies, and was in force at the time of the accident, and that the applicant had agreed that the provisions of the scheme should be substituted for those of the Act of 1906. Therefore they urged that the Court had no jurisdiction, because, by the terms of the scheme, it rested with the Treasury to judge of the alleged incapacity. The scheme in question first came into operation under the 1897 Act, and was then certified by the Registrar as being not less favourable to the general body of workmen and their dependants than the provisions of the Act. Upon the passing of the Act of 1906, the scheme was re-certified. Briefly put, the contentions of the applicant were: (1) That under the 1906 Act the only question for the Registrar was as to the fairness of the scales of compensation, and that it was *ultra vires* for him to certify a scheme which contained other provisions; (2) that it was never intended that the jurisdiction of the arbitrator should be vetoed by the scheme, and that such parts of the scheme as purported to do so were bad; and (3) that the scheme was bad because no ballot of the workmen had been taken nor any certificate of such a ballot made at any time, notwithstanding the provisions for a ballot in the 1906 Act. The County Court Judge followed a previous decision of the Court of Appeal, and held that he had no jurisdiction to hear the claim; and this has been upheld, by a majority, in the Court of Appeal. The Master of the Rolls said the question for consideration was whether a ballot was necessary before the Registrar could re-certify; and, in his opinion, it was not. He could see no justification for insisting upon a fresh ballot at the end of the term of years over which a scheme was to run. There was no hardship involved; for any workman could withdraw, and any of them might combine to apply to the Registrar to revoke his certificate. It had, he added, been brought to the notice of the Court that the Registrar, in 1907, issued certain regulations by which he purported to prescribe the particular form of application under section 15 of the Act of 1906 for re-certification of a scheme; and this form contained a statement that there had been a ballot. In his opinion, the Registrar had only power to make regulations to carry section 3 (relating to new schemes) into effect; and the regulations so far as they dealt with section 15 had no authority.

Local Finances.

In the House of Commons last Friday, there was a long debate on the subject of local taxation and Imperial services—on an amendment to the Address calling attention to the rapidly-growing cost of education and other services of a predominantly national character, and to the additional duties cast upon local authorities by the legislation and departmental administration of the last six years—duties entailing heavy and increasing burdens on local ratepayers, especially in London. One of the speakers remarked that when local authorities had increased their expenditure, exclusive of loans, from £44,000,000 in 1884-5 to £121,000,000 in 1908-9, and when it was remembered that during that time their debt had increased from £173,000,000 to £512,500,000—closely treading now on the heels of the National Debt—it would be recognized that something ought to be done to relieve the ratepayer. These figures have, of course, since the date referred to, been substantially increased. According to a parliamentary paper issued a short time ago—"in order to meet a desire for the annual preparation and publication, at the earliest possible date in each year, of a concise statement of the finances of the principal local authorities in England Wales"—the expenditure of the principal classes of rate-spending local authorities for the year 1910-11 was £122,082,000; and of other bodies for 1909-10, £11,295,000. This gives a total of £133,377,000. The receipts of the former class of authorities for the year 1910-11 (from all sources except loans) were £122,953,000; receipts from loans were £16,137,000; and the expenditure charged on loans, £15,300,000. The outstanding loan debt of these principal authorities at the end of the year named was £410,695,000; and in addition, at the end of the year 1909-10, there were outstanding loans of other local authorities (with regard to whom the special returns were not obtained) amounting to about £128,500,000. In regard to the first-named authorities, the sums outstanding in respect of loans raised for the purposes of electricity, gas and water supply, tramways and light railways, and harbours, docks, piers, canals, and quays totalled to £167,299,000.

In a supplement to the "Sheffield Daily Telegraph" some days ago, the industries for which the town is famous were dealt with at some length; and reference was made to the enterprise displayed by the Gas Company in the experiments they have undertaken to demonstrate the many advantages of gas as fuel in the various processes connected with the manufacture of steel. The result has been that during the past three years they have installed upwards of 250 furnaces and ovens in the district they serve. It is pointed out that a very important factor in the development of the use of gas as fuel in Sheffield is its low price.

The "Engineer" last Friday contained an illustrated description of improved sand-washing plant devised by Mr. W. Polglase, of the Barnes filter-station of the Metropolitan Water Board. At this station there have been used up to within a short time ago sand-washers consisting of a succession of ejector hoppers coupled in series, in which the sand is carried from one hopper to the next by water ejectors. This apparatus was found to be somewhat slow in its operation; and, moreover, it involved the use of a very large quantity of water. About two years ago, Mr. Polglase began making experiments with a view to improving the apparatus then in use, and after many trials has evolved the plant described in the article. This apparatus, as fitted up at Barnes, has been adapted to the existing ejector washers, with the result, it is stated, that where eight hoppers were needed in each unit for the cleansing of the sand before the improvement was effected, three are now sufficient to cleanse a considerably larger amount of sand per hour, with the expenditure of not much more than half the quantity of water previously used, and a large saving in labour.

PERSONAL.

Mr. BENJAMIN GREEN, the Secretary and General Manager of the Mitcham and Wimbledon Gas Company, has retired after forty-seven years' service; and the Directors have elected him to the seat on the Board rendered vacant by the recent death of Mr. J. J. F. Stevens.

Mr. CORBET WOODALL was not well enough to be present at the meetings of the proprietors of the Croydon and Bournemouth Gas Companies last Friday. But we are pleased to announce that he is better. His messages to his colleagues are cheerful; and the enforced rest is producing the recuperation that will soon bring him back again to the wonted scenes of his activities.

At the Grand Hotel, Brighton, on the 10th inst., Mr. JOSEPH CASH, the Engineer and General Manager of the Brighton and Hove Gas Company, was entertained at dinner by the officials, in celebration of the completion by him of fifty years' service with the Company. At the conclusion of the dinner, a handsome gold watch, suitably inscribed, was presented to Mr. Cash, in testimony of the esteem in which he is held.

At a recent meeting of the Gas Committee of the Abertillery Urban District Council, it was unanimously recommended that the salary of the Engineer and Manager, Mr. LEONARD J. LANGFORD, should be increased by £75, in consideration of the large extensions carried out and the rapid growth of the undertaking since his appointment three years ago. The recommendation was adopted at a special meeting of the Council.

After upwards of sixty years' active connection with the gas profession, Mr. J. R. FRITH has resigned his position with the Runcorn Gas Company; having been their Engineer and Secretary for nearly forty-nine years. He is succeeded by his son, Mr. GEORGE STEVENSON FRITH, who has been Engineer and Secretary of the Frodsham Gas and Water Company for twenty-three years. On his resignation being accepted, the shareholders unanimously elected him a Director of the Company. The position he relinquishes has been filled by the appointment of Mr. J. R. Frith's youngest son, Mr. ERNEST FRITH, who has for more than seven years been Assistant to his father.

There will be universal regret at learning that Mr. JAMES W. HELPS is suffering from physical breakdown, and is now at Aix-la-Chapelle undergoing special medical treatment. For the time being, he has had to relinquish all concern in business matters; but it is good to learn, from the communications made at the meeting of the Croydon Gas Company last Friday, that he is considerably better, and is hoping ere long to be back again leading in the technical and executive affairs of the undertaking, towards the prosperity of which he has contributed so much. There rest with a large circle of friends at home sympathy with him and Mrs. Helps and hope for a thorough restoration proceeding from present quiet and treatment.

Mr. JAMES D. KEILLOR, of Ardrossan, who has been appointed Manager of Hawick Gas-Works, has had a varied experience in his profession. He has filled the positions of Assistant Manager to the Musselburgh Gas Company, of Assistant Engineer and Manager to the Kirkcaldy Gas-Works, of Engineer and Manager of the Lochgelly Gas-Works, and of Engineer and Manager of the Ardrossan Corporation Gas-Works. The new Manager at Hawick, who is 31 years of age, has a good record of progressive and up-to-date management. It may be mentioned that three of Mr. Keillor's brothers hold the position of Gas Engineer and Manager at Broughty Ferry, N.B., and at Hamilton and Ottawa, Canada, respectively.

An interesting event in the history of the East Hull Gas Company (which was incorporated in 1867 as the Sutton, Southcoates, and Drypool Gas Company, and retained the name till 1906) occurred yesterday, when the Chairman, Mr. JOHN J. RUNTON, completed fifty years' connection with the undertaking. He joined the Board on Feb. 19, 1862, and has been Chairman since October, 1880. Mr. Runton is well known in connection with the gas industry. He is a member of the Institution of Gas Engineers, and his association with it and its predecessors has extended over about thirty-four years. His friends will be pleased to learn that he is hale and hearty, and to all appearances likely to render many years of useful service.

We learn that Mr. ARTHUR R. WARNES, late of Birmingham, has commenced business as a Consulting Chemical Engineer and Technical Chemist, at Nos. 13, 15, and 17, Green Lane, Hull. Mr. Warnes has had a very varied practical experience in chemical technology, and has made a special study of problems appertaining to gas manufacture and the working up of bye-products. He has published several original papers, given a large number of lectures before scientific societies, and is a frequent contributor to the Technical Press. Among the many scientific societies of which he is a member, may be mentioned the Society of Chemical Industry (he was recently on the Committee of the Birmingham Section), the Faraday Society, and the Association of Chemical Technologists (he was recently Secretary of the Birmingham Branch). Mr. Warnes has also served on the Council of the Midland Junior Gas Association, and is this week to read a paper on "Investigations on Coal Tar and Some of Its Products" before the Association, in Birmingham.

OBITUARY.

We regret to learn of the death on the 29th ult., after a protracted illness, of Herr JULIUS PINTSCH, junr., who for many years had been a partner and member of the Board of Management of the Berlin firm of that name. It will be remembered that earlier in the same month the death occurred of his brother, Oskar [*ante*, p. 348]. Deceased had been a member of the German Association of Gas and Water Engineers since the year 1883.

By the death, on the night of the 11th inst., at the age of 68, of Mr. THOMAS PERKINS ILIFFE, the Nuneaton Gas Company have lost their Chairman, and a family connection of upwards of sixty years with the Company has been severed; Mr. Iliffe's father having been Chairman in the fifties. Deceased had been a Director since 1870; and had occupied for upwards of thirty years the position he held at his death. He was a native of Nuneaton, and took the keenest possible interest in its Gas Company. Determined to know all the details, however intricate, of anything he took in hand, he made himself thoroughly acquainted with the manufacture of gas, and obtained complete mastery of the business of its supply and the control of such an industry. During his connection with the Company, he saw it grow from a 10 million to nearly a 100 million undertaking. He was senior partner in the firm of Messrs. Iliffe and Son, chemists, and was highly respected in the borough. The funeral, which took place last Thursday, was preceded by a service in the Parish Church.

The Holborn and City of London Public Lighting.

At the last meeting of the London County Council, permission was given to the Gaslight and Coke Company to extend their 6-inch high-pressure main in the Aldwych subway along that subway and the Kingsway subway, also to extend the existing high-pressure main in the Shaftesbury Avenue subway from Cambridge Circus to Broad Street, and to lay a new 6-inch high-pressure main from New Bridge Street, Blackfriars, in the Queen Victoria Street subway, as far as the Mansion House. This will be the first step towards carrying out the new contracts for the lighting of the Holborn and City of London areas. On the main leaving the Shaftesbury Avenue subway, it will travel through Holborn, which thoroughfare, from Tottenham Court Road to Kingsway, will be lighted with 1800-candle power lamps on columns. The main will then connect up to the one in Kingsway and Aldwych, serving those thoroughfares, as well as the new centrally-hung 2000-candle power lamps in Fleet Street, the 2000-candle power lamps in New Bridge Street, and the proposed lamps of similar power in Queen Victoria Street and Queen Street. At the Mansion House, the main will leave the subway and supply the new lamps in Mansion House Street, the Royal Exchange area, and part of Lombard Street. At the Cannon Street junction of Queen Victoria Street, a connection will be made with the subway main, for the purpose of lighting the proposed centrally-hung 2000-candle power lamps in Cannon Street, and those already existing in that thoroughfare. It will finally connect-up with the Company's compressor station in Lower Thames Street, making a continuous run from the compressor station at Horseferry Road, Westminster. From the Lower Thames Street compressor station, a 3-inch high-pressure main will run eastwards through Lower Thames Street, Monument Street, and Fish Street Hill, for serving the 2000-candle power centrally-hung lamps. The Tudor Street and Essex Street compressing stations will be closed; the whole of the compressed gas being supplied from Westminster, backed up by the compressing plant at Lower Thames Street.

Recent Staff Changes in the Gaslight and Coke Company.—In noticing this matter under the "Personal" heading in the "JOURNAL" last week, we learn that the remarks on the subject at the close of the Governor's speech at the recent half-yearly meeting were taken rather too literally. When mentioning the retirement of Mr. Wilton, it should have been stated that Mr. Reidie was available to fill the vacancy thus caused in the engineering staff, but not necessarily to succeed him at Bow Common. Indeed, as recorded in the "JOURNAL" for the 19th of December last (p. 816), Mr. Wilton's successor at the station named is Mr. A. C. M'Minn, jun.; and the other staff changes are exactly as there announced, with the addition of the appointment of Mr. A. H. Solomon to the Shoreditch station, in place of the late Mr. Iago.

Death of Our Scottish Correspondent.—We regret to announce the death, yesterday morning, of Mr. John Pirie, who for abou a quarter-of-a-century was the correspondent of the "JOURNAL" for Scotland. In this capacity he was not only well known to gas engineers and managers across the Border, but also to a large number in Ireland, as he had for some years—practically from the commencement—attended the meetings of the Irish Association; and he had a wide circle of friends. Mr. Pirie was not well on the occasion of the last Irish meeting; and from that time his health began to fail. Although he attended the meeting of the North British Association in September, he was unable to take part in the later proceedings. A few weeks ago, there was some slight improvement in his condition; but unfortunately it was not sustained. He leaves a widow and family.

THE BRITISH COMMERCIAL GAS ASSOCIATION.

First Meetings of the General Committee and the Executive Committee.

After delays that may to some people have appeared unduly great, but which are realized to have been inevitable by those who know the amount of work involved in, and the length of time necessary for, the bringing together of all the units in a combined movement such as this, the machinery of the British Commercial Gas Association has now been established, and will very shortly begin to work.

The first meeting of the General Committee was held on Thursday last, under the presidency of Mr. R. G. Shadbolt. The Committee, which has been elected by the subscribing undertakings in the various districts of the United Kingdom (a process that has occupied a considerable length of time) consists of the following:—

Chairman.—President of the Association (R. G. Shadbolt).

Vice-Presidents.—J. Ferguson Bell (Nominated by the Institution of Gas Engineers).
H. James Yates (Nominated by the Society of British Gas Industries).
[To these will subsequently be added three other Vice-Presidents, whose nomination lies in the hands of the Vice-Presidents as a body.]

Hon. Treasurer.—S. Y. Shoubridge.

Ordinary Members.

Eastern District.—J. W. Auchterlonie, of Cambridge.

Ireland.—Alderman W. F. Cotton, M.P., D.L., of Dublin.

Manchester District.—Edward Allen, of Liverpool.
Councillor Kay, of Manchester.
Alderman F. S. Phillips, J.P., of Salford.
F. A. Pye, of Chester.
Robert Watson, of Doncaster.
Charles Wood, of Bradford.

Midland District.—Thomas Berridge, of Leamington.
Robert S. Hilton, of Birmingham.

Northern District.—T. H. Duxbury, of South Shields.
Thomas Waddom, of Newcastle-on-Tyne.
John Young, of Hull.

Scotland.—Bailie R. Kirkland, of Glasgow.
Bailie Thomas Paxton, of Glasgow.

Southern District.—C. E. Botley, of Hastings.
A. E. Broadberry, of Tottenham.
F. W. Goodenough, of London.
B. R. Green, of Mitcham.
H. C. Head, of Winchester.
Douglas Helps, of Reading.
A. A. Johnston, of Brentford.
W. M'Dowall, of London.
W. E. Price, of Hampton.
D. Milne Watson, of London.

South-Western District.—W. N. Westlake, of Exeter.

Wales.—George Clarry, of Cardiff.

Society of British Gas Industries.—W. D. Helps, of Leeds.
H. M. Thornton, of London.
Fred. J. West, of Manchester.
Cyril G. Davis, of London.

The Committee proceeded to elect the following members to constitute the Executive Committee:—

S. Y. Shoubridge (Hon. Treasurer), F. W. Goodenough, R. Watson — Nominated by the Institution of Gas Engineers.
H. M. Thornton, H. James Yates — Nominated by the Society of British Gas Industries.
Edward Allen.
Thomas Berridge.
A. E. Broadberry.
Robert S. Hilton.
W. M'Dowall.
W. E. Price.

The Executive Committee, at a subsequent meeting, elected Mr. Goodenough as Chairman, and Mr. Yates as Vice-Chairman. Mr. Goodenough, therefore (under the rules), becomes the Deputy-Chairman of the General Committee.

The following were elected as Vice-Presidents of the Association, under the rule which empowers the General Committee to elect Vice-Presidents "from amongst eminent administrators connected with subscribing undertakings:"

Alderman W. F. Cotton, M.P., D.L., of Dublin.
Mr. C. S. Ellery, of Bath.
Colonel H. Oakden Fisher, of Cardiff.
The Lord Provost of Glasgow.
Sir Daniel Ford Goddard, M.P., of Ipswich.
Mr. Charles Hunt, of London.
Councillor Kay, of Manchester.
Bailie Thomas Paxton, of Glasgow.
Alderman F. S. Phillips, J.P., of Salford.
Alderman W. B. Redfern, of Cambridge.
Alderman Sir Hallewell Rogers, of Birmingham.
Sir W. H. Stephenson, of Newcastle-on-Tyne.
Colonel W. Taylor, M.D., J.P., of Cardiff.
Mr. Hanbury Thomas, of Sheffield.
Mr. Corbet Woodall, J.P., of London.
Mr. Harold W. Woodall, of Bournemouth.

Forty-nine representatives of subscribing undertakings were elected as associate members.

The General Committee agreed that the Association should give its patronage to the International Smoke Abatement Exhibition, to be held at the Agricultural Hall from March 23 to April 4 next.

ELECTRICITY SUPPLY MEMORANDA.

Domestic Electrification—A "Typical" Electrically Prepared Week's Menu—Time and Costs—A Clever Trial Scheme—A Water-Heating Disadvantage—Testimony for the Private Electricity Generating Plant—Things Left Unsaid—A Little Evasion at Marylebone.

We have been following with some amount of interest the articles in the "Electrical Times," on "Heating and Cooking," from the pen of a "Domestic User." The first article has already been noticed; and there are not many comments that need be made on the remainder as they got somewhat cataloguish. Until the last instalment of the articles had been reached, there had been a notion that we had been accompanying a millionaire through the two years' experience; for, if we understand him correctly, he has installed in his house such a number of electric appliances that it must be a veritable show establishment, and the cost of running the "plant" (with renewals) must represent a considerable item in the expenditure of this "Domestic User's" domicile. When, however, the last chapter of this beautifully told story was arrived at, we came across a "typical" week's menu in the household of "Domestic User" during the cheerless month of November. Our picture of the millionaire, on glancing down this menu (the cooking in connection with which was dealt with electrically), promptly vanished; and the practical conclusion was come to that this householder could well afford something better for his wife, family, and himself in the way of good square, hot meals in winter time, if he did not waste so much money on electricity.

Was it Dan Leno or Little Tich who used to tell the tale of his experiences in lodgings—of, among other things, how the joint cooked on Sunday was served up again and again through the greater part of the week in various ways, until the remains knew their way in and out of the dining-room? In this "typical" week's menu in this electrically governed household, there only seems to have been one joint of beef cooked, weighing 5 lbs. That was on Sunday. Same day *cold* meat for supper. Monday, lunch, *cold* meat; dinner, *cold* beef. Tuesday, lunch, *cold* meat; dinner, hash. We are not sure whether that joint had then been laid to its final rest, because we see on Wednesday, stew was served up for lunch, and a meat pie for dinner. Anyway, on Thursday, there was a decided change. Four chops were grilled for lunch; and for dinner, the luxury of a roast fowl was indulged in. That poor fowl also did duty in a stew for lunch on Friday. That day for dinner there was no meat, but fried plaice had to suffice. On Saturday grilled steak was served for the midday dinner; and, before going to bed, grilled sausages were sent up for supper. These were the staple things that were electrically cooked for lunches and dinners during the week, with a good adherence to cold meat at the beginning. The whole menu is composed of little more than the odds-and-ends that are cooked in most households. The breakfasts for the week were varied between boiled eggs, grilled bacon, or grilled kippers. For luncheons and dinners, two vegetables were cooked. Some sort of milk pudding was the usual sweet; once there was a jam tart, and once a jam roll. But the people in this house of extravagance in electricity consumption live very modestly. It is the simple life that is portrayed here. We are not told anything about quantities, except in the case of the 5-lb. joint of beef, whose sojourn on earth seems to have exceeded the ordinary span of the lives of such human necessaries. For cooking this humble fare, 39 units of electricity were employed, which, at 1d. per unit, would represent 3s. 3d., or at 1½d., 4s. 10½d. The meat considerately adopted the electrical standard of shrinkage; the 5 lbs. 6 oz. losing by evaporation only 8 oz., or 10·7 per cent. of its bulk. "With gas cooking," "Domestic User" remarks, "the loss *may be* anything between 25 and 33 per cent." Just so! It *may* also be much less if cooked properly. It very much depends on how people choose to cook, and the amount of evaporation that their methods produce. There is the question of time. The Sunday

electrically cooked dinner was the most substantial meal during that November week. The process of cooking the 5 lbs. of beef, the Yorkshire pudding, and the baked rice pudding occupied from 11 o'clock to 1.45; and two vegetables from 11.30 to 1.45 The time factor is manifestly not a negligible one in electric cooking. The cook who has to prepare meals for a large family will pray to be defended against such an unnecessary burden being piled upon her existing responsibilities.

As to cost. Supposing this "Domestic User" pursues with his family this monotonous round of scrappy meals for fifty weeks in the year (allowing a fortnight at the seaside), and assuming he has made no mistake in the energy consumption, and that it continues on the same lines, the cooking alone will total to £8 2s. 6d. a year charged at 1d. per unit, and £12 3s. 9d. at 1½d. per unit. It will be much more than that adding great occasions and special preparations for visitors. Then a "Therol" 200-watt per hour water-heater is used, consuming about 1752 units in the year, representing an outlay, at 1d. per unit, of £7 6s. a year, or at 1½d. £10 19s. He tells us that hot or scalding water is always available in large quantities. We should like to test that assertion by obtaining an answer to the inquiry as to how often the bath is used during a week in that domestic circle. Then when noticing the article on domestic heating [*ante*, p. 271], it was seen how, to heat four rooms for fourteen hours a day, on the figures supplied by "Domestic User," at 1½d. per unit, the cost would come to 7s. 7½d., allowing nothing for the other six rooms in the house. This same person uses other electric appliances. Really his friends would do well to advise him to go in for more economical methods, and use some of the saving in better and more varied feeding. We also observe that with electricity, in order to get the best results, it is necessary to keep the vessels highly polished. That means labour. There is the further difficulty of getting renewals and repairs done quickly in the locality.

There are many suppliers of electricity who are shy of electric cooking, and, though they want to dabble a bit in it, they do not care to incur any expense. We have met a few electrical people in our time; and the curious part about them is that, while there is all this bluster about electric cookers and what they can do, there are so few of them who have jumped at adoption of the electrical process on their own account. They ought to be the first; but they clearly know more than a layman. A wonderfully devised scheme has been developed at Oldham for cultivating business in this direction. The Borough Electrical Engineer (Mr. S. Wilmott Newington) deserves high praise for the ingenious proposal, though part of it—the free current—had an exemplar at Marylebone. In order to stimulate cooking by electricity (this is how we understand the scheme), it is proposed that for a trial period patrons of the department are to be allowed to use electric-cookers free, and to have the necessary energy on the same moderate terms. Mr. Newington thinks that makers of the electric appliances will be willing to lend the apparatus for the experiments. Therefore for this trial, it is intended that the electricity department shall not incur any liability for the electric apparatus, and that the electricity consumers generally shall bear the expense of the energy absorbed by the experimentalists. The idea is a capital one; and the Corporation are to be heartily congratulated on the cleverness of their Electrical Engineer. But how many makers of electric cookers will be prepared to lend Oldham cooking-ovens? If every electricity supply undertaking in the country asks makers for similar trial privileges for their consumers, the manufacturers will soon find themselves on the high road to the bankruptcy court. One electrical writer thinks that so enterprising a policy as the one planned at Oldham cannot fail to add substantially to the demand for cooking and heating appliances, and few who avail themselves of the opportunity will have any desire to return to the use of gas. This is purely a matter of opinion, founded on the well-burnished hope of that particular writer. The present writer so far only personally knows of one lady—with a relative at an electricity generating station—who adopted an electric-cooker; and she is on with the old love again. First the novelty of the thing supported the cooker; then ardour waned with experience; disgust soon followed; and the gas-cooker was again welcomed as an old and trusty friend of the whole household.

Besides the inherent disadvantages of the electric-cooker such as its temperature lag, the superhumidity of the oven atmosphere during the cooking of the meat that prevents anything being baked at the same time that requires a crisp exterior, and the cost unless the electricity is at an unprincipled and absurdly low price, there are collateral disadvantages outside it that would alone prevent any large adoption. It will be remembered that recently some plain home truths on electric laundry irons were extracted from an article that had appeared in the "Electrician," from a writer of practical experience in the electrical equipment of laundries. This same writer has since had a shot at the deficiencies of electricity in domestic applications. He has pointed out, among other things, that the hot-water requirements in most houses are almost continuous; and, in meeting these requirements, the calorific value of town gas enables the competitors of electricity to belittle its efforts. While another agency for hot-water supply has to be retained, this electrical critic considers that the "advantages" of electric cooking are minimized. This phase of the matter he thinks must be dealt with at once, and every endeavour made to strengthen the position of electricity. But the trouble is that electricians cannot alter the thermal power that Nature has bestowed upon electrical energy. Anyway, he is of opinion that the present water-heating appliances are capable of improvement; but he does not promise that he is going to attempt to make a fortune in trying to succeed where others have failed. This reminds us that the utensils used on the hot-plates of gas-ovens—kettles, saucepans, &c.—are of a most heterogeneous order, and some of them ill-shaped for the purpose of realizing the best efficiencies. Consumers purchase the articles of commerce that fancy or price dictates, without any thought on the question of whether their shapes are the best calculated to obtain the most efficient result from the boiling-burners. This is another effect of the cheapness of the B.Th.U.'s of town gas. Little attention has been paid to this matter; and yet if consumers only knew what were the best shaped utensils to use, they would find that they could be purchased at just as reasonable prices as the ill-shapen ones that they at present buy. If the right shapes are not in all localities procurable, the demand for them would soon create the supply.

It will be within the recollection of readers that there has been an agitation at Liverpool regarding the prices charged for energy by the Corporation Electricity Department. A tariff revision has resulted; but the details would not be particularly interesting to readers. There is one matter, however, that received prominence during the controversy, which again calls for notice. It is the success of the private gas-driven electricity generating sets in the city. In an official report that has been presented to the Council on the subject of the tariffs, there is good advertisement of, and good testimony as to, the efficiency of such plants for long-hour users. Naturally, some reason had to be adduced for the existence of these private plants. Therefore it is said experience shows that in Liverpool the majority of the power users are "short-hour" ones, and that users of power who are able to run their private plants at a steady load for a large number of hours per annum are unlikely, under ordinary circumstances, to take a supply from the Corporation, as they are obviously free from many of the costs incidental to a supply given by a local authority under parliamentary obligations. With private plant, the cost of producing electrical energy is limited to the actual works' costs and supervision. There is also no obligation on the private producer to write-off his capital in a limited number of years, or to provide special funds for the renewal of plant. For these reasons, the actual net cost of production by a private consumer cannot be fairly compared with the price at which the Corporation can sell electrical energy commercially, as the conditions are widely different. On the other hand, the adoption of the Corporation supply relieves the consumer from all stand-by expenses, and places at his disposal, for the purposes of his business, the space (often of considerable value) which would be occupied by his own plant, and in addition renders unnecessary capital expenditure that he would otherwise have to incur. It is thought that, when these advantages are duly considered, a gradual transfer of consumers to the Corporation supply, as the private plant at present in service wears out, seems very probable. We think it is very improbable, with the increasing cheapness of gas supply for gas-engine use. However, electrical recognition of the fact that there is something to be said in favour of the private gas-driven generating plant is a change from the colossal ignorance on the subject that electricians so often pretend that they possess.

In a little leader paragraph, the "Electrician" recently referred to public lighting matters. In the first place, it describes the change-over from electric arc lamps to high-pressure gas lighting in the very heart of Westminster City as "retrograde." There must be some reason for the use of the term. We wonder what it is. Is it because high-pressure gas lighting on the high-efficiency inverted system is more modern than the electric arc lamp? Is it because the light is excellent? Is it because the lamps have largely exceeded their contract illumination? Is it because there are no other lamps in Westminster that show such a low cost per candle power per annum as these lamps, according to Mr. J. W. Bradley's own tests and resulting computations? Is it because there is not the same glare about them that there is about the flame arc lamp? Is it because the lamps refuse to flicker in the same annoying fashion as the flame arc lamps? We should really like to know what the "Electrician" thinks entitles them to the term retrograde. The paragraph also refers to the supersession of arc lamps by metallic filament ones. It further mentions the transfers from gas to electricity in certain boroughs in London. Upon this, it makes the remark: "It will be seen therefore that the reports fostered by the gas companies in the provinces, that London is reverting to gas for public lighting, are far from the truth." There is omission in mentioning that the boroughs in which there has been conversion from gas to electricity are those in which the electricity-supply undertakings are very much managed by the local Councils, and where real competition for the public service has not been allowed. There is no emphasis laid in the paragraph upon the £10,000 excess of initial expenditure in converting the public lamps at Hampstead—in fact, the sum appears to have escaped the writer's memory. Nor is reference made to the fact that the original estimates of illumination and costs in Hampstead and Marylebone were based upon lower candle power metallic filament lamps than it has been found necessary to since establish in certain of the streets and places, because the public verdict has been that the lamps first installed were inferior to even the old upright incandescent gas-burners that preceded them in the service of the community. We are sorry that pressure of other matters caused our contemporary to temporarily forget these points when writing the leader paragraph

in question. It is awkward that such slips should occur; but still it is only human.

Mr. A. Carson Roberts, the Local Government Board Auditor, has found the Electricity Department of the Marylebone Borough Council doing something that he believes is *ultra vires*. It seems that, under section 20 of the Council's Act of 1904, they are empowered to trade in fittings and electrical materials of any kind, and to enter into contracts for the installing of them; but it is also provided that the Council "shall not themselves execute the wiring of private property except between the main of the Council and the consumer's meter." Now, the department it is said has been attempting to defy and evade the stipulation by obtaining the actual labour for wiring work through a contractor, who merely receives a commission on the labour cost. Mr. Carson Roberts says there is no putting out of the wiring to contract, for the work is arranged and directed by the officers of the Council, the allotment of the workmen's time is controlled by them, the supply of all material and of some of the tools is arranged by them, and in some instances even the engagement of extra men. No other contractor has the opportunity of tendering for the work which is executed on this plan. However, Mr. Carson Roberts beyond pointing to the discrepancy between act and decree does not take any action in regard to the matter on this occasion, as he understands that there is to be some revision of the arrangement. Mr. Seabrook will probably put the act into the category of "expediency," which forms the basis of so much that is done in connection with the Marylebone Electricity Department.

GAS v. ELECTRIC COOKING.

Mr. F. S. Grogan's "Reply" to Criticism.

In the "Electrician" last week, there appeared the following letter from Mr. F. S. Grogan referring to the comments in our "Electricity Supply Memoranda" last week. With the letter before them and the article to which it alludes, our readers may judge for themselves whether it is necessary for us to pursue further the statements that have been made by Mr. Grogan, which statements are the subject-matter of discussion. It hardly seems worth while to go further with them just now, as Mr. Grogan announces his resolve of not answering "any further attacks of the present nature." The fact of the matter is he has not replied to any of the questions put to him regarding the validity of his own main statements. The contest with Mr. Marks, on the terms of the challenge laid down by him, appears to be relegated to "months ahead." Those terms the "Electrician" holds are of a character that cannot be met by any cook with a gas or other oven; so that Mr. Grogan has very good reason for taking up the challenge as soon as the press of engagements "months ahead" will permit him. Then for Mr. Marks' public downfall! Meantime, will the latter gentleman kindly supply the dimensions of the gas-oven he would suggest using to carry through the baking simultaneously of the various articles of food he named in his conditions? Will Mr. Grogan also supply us with the name of the retired gas engineer to whom he refers in his final paragraph, in order that we may ascertain whether his information is correct or otherwise? It would be a pity for Mr. Grogan to labour under any misapprehension. We promise in return to publish a full and unvarnished account of the result of our inquiry.

It is observed that Mr. Grogan's "services as a journalist are available through the usual channels." May we therefore have the pleasure of inviting him to contribute an article to the "Journal," on the usual terms to contributors, replying point by point, fully and candidly, on behalf of Mr. Grogan, to the criticisms that have appeared in these columns?

This is Mr. Grogan's letter in the "Electrician:"

Sir,—Seeing another two-and-a-half columns in the current issue of the "Journal of Gas Lighting" devoted to the "Electrician" and myself, I venture to offer the following comments. I originally wrote you in regard to unfair criticism of electric cooking by the British Commercial Gas Association in a Manchester paper. In this letter I gave many *facts*, which I still maintain are correct. The Gas Association has not answered; but the "Journal" took upon themselves the attack, and you were good enough to publish my reply dealing with this attack. The present two-and-a-half columns are again written without any facts to support the gas side; and there is very little to add to my previous letters. The "Memoranda" this week, however, opens with practically an admission that the conditions I have found do exist in limited cases. Now the question is, taking London and the Provinces together, how often are the conditions I have experienced met with in the kitchen? It is suggested that an unkind "fate" has been responsible for my personal experiences; but I fear that fate has also been unkind to hundreds and thousands throughout the United Kingdom.

My refusal to enter the columns of your contemporary is characterized as cowardly. Why? I have merely put up a strong defence to a wanton attack on electric cooking. My services as a journalist are, however, available through the usual channels.

The two results which I gave on gas pressures appear to have been mixed up by your contemporary. The pipes in question leading to the gas-stove tested in London area were not put in for lighting only. I account for the changes in pressure by the varying load in the vicinity, and by the fact that the regulations controlling a gas supply only stipulate certain minimum pressures to be maintained on the gas-mains.

Regarding Mr. Marks' letters, I endorse what has already appeared in the "Electrician," and think that it is up to that gentleman to mention the size of his oven shelf, and the available vertical cooking height in the oven he proposes to use. Let the "Journal of Gas Lighting" ask him for these dimensions; and they will be satisfied that he cannot possibly refer to an ordinary domestic oven. With reference to Mr. Marks' proposals, I think that some such plan as that outlined by the "Electrician," with a programme arranged by an unbiassed committee, would be excellent. As, however, I am busily engaged every week for months ahead educating the public up to electric cooking, I cannot possibly spare the time at the moment.

Until the "Journal of Gas Lighting" puts up facts, I have no intention of answering any further attacks of the present nature—viz., two-and-a-half columns without a single fact!

I would add, however, that only last week it came to my knowledge that a well-known gas supply engineer, who is now retired, said that, although he was associated with gas supply all his life, he did not see why he should poison himself and family now with gas fumes. He has accordingly had his house fitted with electric radiators throughout.

WATER BILLS FOR 1912.

[Second Article.]

In the last number of the "Journal," the principal features of the Bills promoted by companies for obtaining powers in respect of the supply of water were noticed. We now deal with those of local authorities.

The Bedwellty Urban District Council wish to be empowered to purchase certain gas and water undertakings, and supply gas and water in their district. The proposals of the Council in regard to gas were fully set forth in the "Journal" for the 30th ult. (p. 272). The water undertakings indicated are the New Tredegar Company, with whom an agreement has been entered into, and the Rhymney and Aber Valleys Gas and Water Company, the portion of whose undertaking in a part of Bedwellty is now required. The water limits are defined; and the rates to be charged for the supply of water therein are to be based on the rateable value of the premises—ranging from 3d. and 4d. per week to from 10 down to 6 per cent. per annum, with extras. Supply by meter is to be at a rate not exceeding 2s. per 1000 gallons. Powers are required to supply fittings and to purchase and sell water in bulk. The Council ask for authority to borrow for the purchase of the undertakings already mentioned the necessary sums, to be repaid within forty-five years from the date of borrowing. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Belfast City and District Water Commissioners are asking for an extension of the time limited by their Act of 1893 for the construction of the storage reservoir in the valley of the Kilkeel River (as altered and varied by the Act of 1903), and for the completion of other works authorized by the first-named Act, to the 27th of July, 1925; also for a similar extension of time in regard to the reservoir in the Annalong Valley and other works sanctioned by the Act of 1897, a revival of powers for the compulsory purchase of lands authorized by the Act of 1899, and authority to acquire additional lands (which are fully specified) for water-works purposes. Permission is sought to borrow such further sums of money, not exceeding £500,000, as shall be requisite for the undertaking. The Bill contains a clause enabling the Commissioners to pay, out of the revenues of the undertaking, "reasonable subscriptions to the funds of any society having for its object the scientific study of water supply, and any association of water-supply authorities or their officers formed for the purpose of consultation as to their common interests and for the discussion of matters relating to water supply, and any reasonable expenses of the attendance of any of the Commissioners or their officers who may be appointed by the Commissioners to attend at conferences or meetings of such associations or any of them, and of purchasing reports of any such conferences or meetings." It is proposed that the limit of the domestic water-rate mentioned in the Act of 1884 shall be altered from 1s. 8d. to 2s. 6d. All hotels, &c., are to be assessed to the public, and not to the domestic, rate; and the Belfast Poor Law Guardians and public bodies are not to be exempted from the payment of water-rates in respect of hospitals and school buildings belonging to them. [*Parliamentary Agents: Messrs. Martin and Co.*]

The Church Stretton Urban District Council are applying for authority to purchase the undertaking of the Church Stretton Water Company, and supply water within the parishes of Little Stretton and All Stretton, in the county of Salop. The Council are to serve upon the Company, within six months after the passing of the Act, notice of their intention to purchase. The price is to be settled, in default of agreement, by arbitration; and the Council are to pay the taxed costs of obtaining the Act of 1899 and of those incidental to the winding-up of the Company. The minimum charge for water is to be 8s. 8d. per annum; and the Council are not to be compelled to furnish a supply for domestic purposes to any dwelling-house or part thereof of which the rateable value amounts to, or exceeds, £15, for any less period than six months. The Council require authority to borrow the necessary money for the purchase of the undertaking and the payment of the costs of the Act. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Derwent Valley Water Board are applying for an extension of the time limited by their Act of 1909 for the compulsory purchase of lands, and for authority to make provisions as to compensation water and gauges. The lands in question are situated in certain parishes in the county of Derby; and the period named

for their purchase is extended to ten years from the passing of the Act. Notwithstanding anything contained in the Acts of 1899 and 1901, the Board require authority, for the purpose of filling the Howden and Derwent reservoirs, to appropriate the waters of the Derwent, so long as such appropriations do not reduce the flow over the Yorkshire Bridge weir below 8 million gallons in 24 hours. [*Parliamentary Agents: Messrs. Dyson and Co.*]

One clause in the General Powers Bill of the Dover Corporation relates to water supply. It is to enable the Corporation to enter into agreements with the East Kent District Water Company with reference to the reduction of the rates to be charged for water in the portion of the borough within the statutory limits of the Company, in order that they may correspond with those now charged to the Corporation in the rest of the borough; and also to provide for the reimbursement by the Corporation to the Company of the deficiency of income suffered by the latter in consequence of the change. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

The Egremont Urban District Council are applying for authority to construct and maintain water-works, and supply water within their district. The works proposed are an intercepting dam or intake weir and gauge in the parish of Ennerdale and Kinniside, to be situated upon the Wormgill Beck, an intake or settling-tank in the same parish, a service reservoir in the parish of Haile, and two aqueducts or pipe-lines; and seven years are required for their completion. The Wormgill Beck and Bleaberry Gill are to be the sources of supply. The charges for water are based upon the rateable value of the premises; being 8s. 8d. where it does not exceed £5 per annum, 11s. between this and £7, 7½ per cent. up to £20, and 7 per cent. beyond this. For supplies by meter, the charge is not to exceed 1s. per 1000 gallons. Provision is made for the supply of water in bulk, and for obtaining it by agreement from the Arlecdon and Frizington Urban District Council, or any other local authority, water board, company, or person able and willing to furnish it. The Council wish to be empowered to borrow £27,500 for the purchase of lands and easements, and the construction of the works specified, £1000 for mains and the improvement of the works, and the amount required for paying the costs and expenses of the Act; the two amounts specified to be repaid within thirty years from the date of borrowing, and the costs within five years from the passing of the present Act. [*Parliamentary Agents: Messrs. Hargreaves and Crowthers.*]

The Fylde Water Board wish to be empowered to construct additional works, and make better provision with regard to their undertaking. The works are of an extensive character: comprising four impounding reservoirs, two service reservoirs, ten aqueducts or pipe-lines, and four road diversions. The Board require twenty years for the completion of these works. Provision is made for taking water, subject to certain restrictions, from the Bottoms Beck, the River Hodder, and the Croasdale Brook till the impounding reservoirs are completed. The Board are applying for authority to borrow £1,334,830 for the purchase of land and the construction of reservoirs, making road diversions, &c.; £404,720 for the aqueducts; £120,000 for the completion of the reservoir sanctioned by the Board's Provisional Order of 1904; and the necessary amount for paying the costs and expenses of obtaining the Act. Sixty years are required for repaying the first amount, fifty-five for the second, forty for the third, and five for the last one. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

In the General Purposes Bill promoted by the Hertford Corporation, there is a clause giving the Corporation power to lay pipes in streets not dedicated to public use. It sets forth that the Corporation may, for the purpose (*inter alia*) of water supply, or for supplying any premises, on the application of the owner or occupier thereof, with water, where such premises are within the Corporation's water limits, and abutting on, or being erected in, any street laid out but not dedicated to public use, lay down and renew such pipes as may be requisite for the purpose of affording such supply; and with regard to the exercise of these powers, the Water-Works Clauses Acts, 1847 and 1863, are to apply as if the street were one within the meaning of these Acts. [*Parliamentary Agent: Mr. R. A. Read.*]

The Ivybridge Urban District Council are seeking confirmation for the construction and use of the existing water-works, comprising an intake on the River Erme, a supply-pipe from it to a reservoir, and a line of pipes from the latter to a defined point in the public road. They are also applying for authority to construct a reservoir on the Butter Brook, two aqueducts, and an approach road. Ample provision is made for furnishing compensation water. The limits of supply are the district of the Council; and the rates to be charged are the usual 8s. 8d. where the rateable value of the premises does not exceed £4 per annum, and 10 per cent. on the rateable value where it is higher than this. In the case of meter supplies, the charge is not to exceed 1s. 6d. per 1000 gallons. The Council wish to be empowered to sell water in bulk. In connection with the construction of the reservoir, they require £6680; for the other works, £1420; and, of course, the amount necessary to defray the expenses of obtaining the Act. They desire that the repayment of the two amounts specified may be spread over sixty and fifty years respectively from the date or dates of borrowing; and that five years from the passing of the Act may be allowed in the case of the last amount. [*Parliamentary Agents: Messrs. Torr and Co.*]

The Keighley Corporation are applying for power to construct additional water-works and abandon some authorized by their Acts of 1869 and 1898. The new works proposed comprise an enlargement of the Lower Laithe reservoir sanctioned by the first-named Act, a service reservoir in the parish of Oakworth, three aqueducts, and a road diversion; and ten years are required within which to complete them. A sum of £195,200 is needed for carrying out the reservoirs and making the road diversion, to be repaid within sixty years; and £13,550 for the construction of the aqueducts, repayable in fifty-five years. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

The Kingston-upon-Hull Corporation are desirous of purchasing by agreement, in addition to any lands they are authorized to acquire, other lands for the purposes of their water undertaking; but the quantity held in pursuance of the clause bearing upon the matter in the General Powers Bill they are promoting, is not at any time to exceed 100 acres. The Corporation are not to create or permit the creation or continuance of any nuisance on any such lands, or erect any buildings thereon except offices and dwellings for persons in their employment, and such buildings and works as may be incident to, or connected with, their undertaking. The Corporation do not appear to require any additional capital for the particular purpose above specified. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*].

The Llanelly Rural District Council are applying for authority to obtain a supply of water from the River Sawdde, in the county of Carmarthen, and construct new works. These comprise an embankment, an intake weir, a catchwater, two reservoirs, three lines of pipes, and a communication road; and a period of ten years is required for carrying them out. Until the completion of the embankment, the Council ask permission to take from the Sawdde any water they may require, subject to certain restrictions; and when it is finished they are to deliver into the river, at a point above the intake weir, 500,000 gallons per day in a continuous flow, as measured by a gauge they are to provide. The promoters of the Bill wish to be empowered to purchase, at a price to be agreed upon or settled by arbitration, such portion of the water-works and plant of the Urban District Council as is situated within their extended area. The limits of supply are to be the Rural Council's district, with the exception of a portion defined; and the rates to be charged are 8s. 8d. where the gross estimated rental of the premises does not exceed £5, and 10 per cent. per annum when it is above this figure, with extras. The Council ask authority to borrow for the purchase of lands and easements, the construction of works, &c., £175,423; and for the purchase of the works and plant of the District Council and paying the costs and expenses of the Act the sums requisite for the purpose. Sixty and thirty years from the date or dates of borrowing are the periods specified for the repayment of the first two amounts, and the usual five years from the passing of the Act for the third. [*Parliamentary Agents: Messrs. Torr and Co.*]

The Scunthorpe Urban District Council wish to be empowered to construct works, acquire additional lands, and make further provision for the supply of water in their district. The works consist of a pumping-station to be situated to the west of the existing station and works of the Council; and an aqueduct or pipe-line commencing there, and terminating by a junction with the present main at a point defined. Ten years are required for the completion of these works. Authority is sought to raise not exceeding £7000 for the purchase of land and the construction of the works specified, to be repaid within sixty years. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

One part of a General Powers Bill which is being promoted by the Sheffield Corporation relates to the water undertaking. Authority is required to construct a temporary tramroad, which may be abandoned after the completion of the Broomhead and More Hall reservoirs and works sanctioned by the Sheffield Water (New Works) Act, 1867. For the purpose of executing, enlarging, or examining any reservoir or other work, the Corporation ask permission to cause the water in any such work to be discharged into any available stream, watercourse, or ditch. The Corporation apply for authority to purchase and hold lands and exercise powers for the protection of their waters and works; also to fix valves for regulating the supply of water to the Corporations of Rotherham and Doncaster. The Bill contains further provisions in regard to the Rivelin and Loxley compensation water; and others relating to the making of agreements with local or road authorities with respect to the conveyance and delivery of water in bulk, and the laying of mains and pipes necessary for the purpose. The Corporation require authority to borrow £800,000 for the construction of the two reservoirs and works already named, and £5200 for the tramroad; to be repaid respectively in sixty and forty-five years from the date or dates of borrowing. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

Further powers are required by the Swansea Corporation in regard (*inter alia*) to their water undertaking; and they are set forth in one part out of fourteen in a voluminous Bill. The first provision concerns the compensation water to be furnished to the Blaenant Ddu Brook; and under it the Corporation will be able, if it is sanctioned, to supply this water from any of their existing reservoirs. They apply for authority to lay water-pipes in streets not dedicated to public use, fix meters and similar appliances for the detection of waste, and make bye-laws with a like object. A clause in the Bill relieves the Corporation from the obligation to supply with water otherwise than by measure any building used by an occupier as a dwelling-house of which any part is utilized by him for any trade or manufacturing purpose for which water is required, or any hospital, hotel, public-house, inn, school,

boarding-house, or hydropathic or public institution. No money is required for the purposes specified. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

The Tavistock Urban District Council are applying for authority to acquire the water undertaking from the Duke of Bedford, and to make further provision in regard to the supply of water. The price is to be fixed by arbitration; and the purchase is to be completed on the appointed day, which is to be the quarter-day that follows next after the expiration of six months from the passing of the Act. The limits of supply are the parishes of Tavistock Hamlets and Whitchurch, in the county of Devon. Where the premises supplied with water are situated within the district, and are served solely by gravitation, the charge is to be 9d. in the pound on the rateable value; in the case of all other premises, it is to be 1s., with a minimum of 8s. 8d. in respect of any one year. For a supply by meter, the maximum charge is to be 1s. per 1000 gallons, with a minimum not exceeding 10s. per quarter. Provision is made for the compounding of rates with owners of property, and for the supply of water in bulk. Authority is required to borrow the money necessary for the acquisition of the water undertaking and the payment of the costs and expenses incurred in connection therewith—to be repaid within fifty years from the date or dates of borrowing. [*Parliamentary Agents: Messrs. Baker and Co.*]

An extension of time for the construction of the works authorized by the Ystradfellte Water Act of 1902 is being applied for by the Neath Rural District Council, who also require further powers in regard to their water undertaking. The extension proposed is five years from the passing of the Act; and the Council ask for permission to take water from the River Tringarth until the expiration of this time or the completion and filling of the Ystradfellte reservoir, whichever shall first happen. The Council require authority to borrow £144,000 in connection with the construction of the works sanctioned by the Act of 1902, to be repaid within sixty years from the date or dates of borrowing. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, and Co.*]

TROUBLES IN THE GAS INDUSTRY.

HOW TO PROVIDE AGAINST SOME OF THEM.

[COMMUNICATED.]

THE events of the last few weeks have been of a disturbing nature to those administrators of gas undertakings who wish to leave nothing to chance. It has been a time when all energies have been devoted to increasing the normal deliveries of coal, and making all possible arrangements to increase the storage capacity of the works.

In one direction, the gas industry may be considered more fortunate than other industries—that is, in the question of labour disturbances. This is not surprising, taking into account the universally generous way in which labour is treated in the gas industry. Even so, it is too much to expect that the industry is to permanently remain in an undisturbed state when labour unrest is shown to exist to such an extent in so many parts of the country. The trouble at Stalybridge, where all the men left the works in a body, is a case in point. The disaster to the holder at Ilkeston is another instance of an event which cannot but disturb the peace of mind of those responsible for the conduct of gas undertakings. We must ever bear in mind that "accidents will happen in the best regulated families."

This being so, would it not be a step in the right direction to couple-up the mains of one undertaking with those of next-door neighbours? The provision of a meter, a valve, and, in many cases, a short length of main would do all that is required. The cost would be small, and even if never used, it could not but add to the security of the gas supply in every district where such precautions had been taken. It would be in most cases an easy matter to negotiate; and each connection would "kill two birds with one stone," for both concerns might feel they had a reserve which in emergencies would save them from a disaster which is happily rarely experienced.

It may be said that in cases of a prolonged coal strike, or a lengthy period of fog, all gas-works would be in a similar predicament. This is true to a certain extent. But it is also true that some works can and do make a practice of storing twice as much coal as others. Some make carburretted water gas, and some do not. Again, in case of fog, some works are much better situated for bringing into use a substantial amount of reserve plant. We hear of works where every setting is in use in the dark days of December. These are, or course, exceptions, but there are many which have but little reserve plant, and which have therefore nothing to lose and everything to gain from the suggested arrangement.

There are other works where it becomes a vital necessity to provide extra plant—sometimes on a new site and at great expense, to enable them to deal with the heavy winter peak-load, which lasts but a few weeks only. Here is a case where it might be a sound proposition to take a bulk supply from a neighbour differently placed. Similar cases might be multiplied indefinitely. Such provision against unforeseen circumstances has few disadvantages but many advantages; and it might well be adopted as a precautionary measure.

PRODUCTION OF POWER FROM GASES.

Lecture by Professor Burstall.

Last Thursday, Professor F. W. Burstall, M.A., delivered the third of the series of six lectures* on the above subject at the University of Birmingham, before a large audience of the Midland Senior and Junior Gas Associations.

The lecturer said: I propose to consider some of the troubles of the gas-engine, and some of the points to be observed when difficulties arise. At the outset, suppose that it is required to instal a gas-engine, What is the best and cheapest method? To choose between an engine running on town gas and one running on producer gas, each case must be considered on its own merits. There is no general rule as to whether it is better to use coal gas or to employ suction producer gas working on anthracite or coke. It is a matter that anyone can study; and it is only necessary to make a comparison between the cost of fuel in the producer, the cost of labour, the interest and depreciation in one case, and the cost of coal gas in the other.

In Birmingham, there would be very little saved by using a producer plant working on anthracite, as this happens to be very dear, and, moreover, except for large engines, I should not recommend a producer plant, for the simple reason that it is not so convenient, and, in the case of the generation of power, it is always advisable to pay a little extra in order to get some greater convenience. Now suppose that the gas-engine is required for driving line-shafting, and it is to develop 50 H.P. It is very important that the engine should not be overloaded in general running, as more troubles have been experienced from gas-engines being constantly driven at or about full load than from any other cause. A gas-engine should always have from 15 to 20 per cent. of power in hand to deal with emergency loads. If this is done, and the engine is not overloaded, probably a great deal of expense in repairs and depreciation will be avoided. Supposing the engine is to have plenty of power, the next thing is to instal it properly. The old system of installation was to put the engine in a convenient corner, fence it round, start it working, and leave it to run by itself. It is necessary to give a considerable amount of thought to the installation of a gas-engine. The old system was to draw the air supply from the bed-plate. This is the place where there is the maximum quantity of dirt, with the result that the gas which entered the engine was very dirty. In putting in a large gas-engine it is distinctly advantageous to lead the air-shaft to a height of about 40 feet from the ground, so as to eliminate all possible dust. This will cause a material saving on the wear of the engine generally and spring rings in particular. The proper building should be fenced off, and air should be allowed to enter as uncontaminated as possible. At the same time, there ought to be some draught provided in the building, so that any gas which leaks out may be conducted away.

Another prolific source of difficulty is that the water service may not be properly arranged. The customary plan is to place the two circulating tanks about 5 feet above the lower portion of the engine cylinder. A pipe is then taken from the bottom of the tanks to the lower portion of the engine cylinder; and the hot water is led from the top back to the circulating tanks. In the case of large engines, very great care has to be exercised in order to avoid local over-heating and the formation of pockets of air, which leads to cracks. The best plan is to supply cooling water under a head of about 25 feet. The water should be pumped through the water spaces, and then cooled by any device that happens to be available—an air-tower or something of this kind. The water requires to be perfectly clean on admission, as the engine will not stand being supplied with dirty water. The temperature of the cooling water will average about 160° Fahr. in a small engine, down to 120° Fahr. in a large one; and if dirty water is supplied, such a temperature is quite high enough to precipitate any chalky matter, and very speedily choke up the engine. It is advisable to use quite soft water; and it should be carefully filtered, so as to prevent encrustation. It is becoming quite a common practice to make manholes in the water-jackets, so that any deposits may be cleaned out.

The speed of a gas-engine is limited by the inertia of the piston and connecting-rod. If the speed is too high, there is considerable shock in the engine, and the bearings wear loose. Generally, for small engines a piston speed of 600 feet per minute, and 800 to 850 in large long-stroke engines represent maximums. In the case of a 50 H.P. engine, the maximum speed is about 220 revolutions per minute.

I should like to say a little about ignition, because this is one of the great sources of trouble in all gas-engines. There are virtually two systems in use—low-tension magneto and high-tension magneto. In both cases a spark is produced between moving points inside the cylinder by causing a coil of wire to rotate through an angle between two poles of a magnet. Frequently it is found that troubles in the engine are due to the spark failing to pass. Further, unless the spark is of a certain size and temperature, the precise ignition, on which the gas-engine depends for its success, will not be procured. Trouble is also caused if the ignition begins too early or too late. The principal trouble in the low-tension magneto is not in the magneto itself, but at the points. These (generally iron or nickel) wear away, and thus either fail to come into con-

* The two previous lectures appeared in Vol. CXVI., of the "JOURNAL," pp. 469, 752.

tact, or only partially come into contact, with the result that an imperfect spark is produced. So that, whenever you are looking for any defect, make sure that the ignition spark is passing properly. Hot tubes—iron or steel tubes heated to incandescence by a gas-flame on the outside and the gas igniting inside—are still in use. Good makers have, however, abandoned the use of hot tubes, as they are liable to derangement by tubes breaking up.

We will now go a step further, and suppose that we have a 50 H.P. gas-engine which goes very well for a certain time, but which some day refuses to work altogether. Of course, the engine may fail to start because of a number of circumstances. Cold weather increases the difficulty of starting; and in some cases steam is allowed into the cooling jacket in order to warm the engine. Suppose that ordinary town gas is used, with compressed air, for starting. Let us assume that the engine, in place of starting on the third revolution, as it should do, will not start at all. What is to be done? First of all, see that the ignition is in perfect order. This means, of course, drawing the ignition plug out of the engine, and seeing whether the spark is passing between the moving points. If the failure is there, the remedy is perfectly obvious. But suppose that the ignition is all right, and that the engine still fails to start. Next, see if the engine has lost its compression, because this is a very current reason for an engine failing to start. It is always possible to tell whether the engine is compressing properly or not by the simple expedient of turning the engine back by hand. If the engine has got its compression, considerable difficulty will be experienced toward the end of the stroke in getting the piston back at all. If the engine has lost its compression, then examine the valves. It may be that they do not close properly, or that they require grinding-in. If the valves are in good condition, and are working properly, the spring rings should next be examined. The only method of packing the pistons of gas-engines is by the ordinary Ramsbottom ring. This ring is a very useful device; but it is a very difficult one to handle, inasmuch as it depends for its tightness on the sideway fit. The sideway fit cannot be made tight, because the ring would be apt to jam; so that there is always a certain amount of leakage of gas past the rings. This in time causes a certain amount of corrosion, and the rings may then jam completely. Another cause of loss in horizontal engines is due to the cylinder wearing oval. A heavy piston always wears a cylinder oval in time, and then, of course, the spring rings fail to keep back the gases. Spring rings last about three months.

Now these indicate pretty well all the troubles met with in starting the engine. If all these things are correct, the engine will go. I am leaving out of account, for a moment, the question of the producer, as I shall deal with that later. The producer trouble is, of course, brought about by the producer making bad gas. Coal gas practically does not vary from day to day. But in the case of producer gas, there is very considerable variation. Practically speaking, producer gas of 125 B.Th.U. per cubic foot in the morning will drop by five o'clock to about 90 B.Th.U., which means, of course, a corresponding diminution in the power of the engine. For this reason, when a gas-engine is being installed to work on producer gas, the diameter of the cylinder should be larger than for coal gas.

Consider what accidents are likely to happen to gas-engines. Virtually speaking, the weak place of all gas-engines is in the breech. The breech is, of course, the back portion of the cylinder containing the valves. Until recently, it was not customary to trouble very much about the form of the breech—it was made principally to suit the convenience of manufacture; the valves being put on the side, or bottom, or in any other convenient position. You will remember that in the first lecture I showed the standard type of English and Continental engine, with the inlet valve on the top, and the outlet valve on the bottom, giving a conical chamber in which the valves work. This is an admirable arrangement for working the valves; but unless very great care is taken to ensure that all parts are kept at the proper temperature, serious cracks may develop. In the case of a large engine cylinder, the cooling water service should be arranged so that water is actually delivered straight on the hot surfaces. There should be a ring of pipes so arranged to take the water to a particular portion of the engine.

The next, and perhaps a source of failure that is more common than anything else, is the fracture of crank-pins. This is frequently caused by premature ignitions; and premature ignitions are mainly caused by dirt accumulating in the engine cylinder. That is why more troubles have been experienced in the gas-engine since producer gas became general. Coal gas is kept very clean for lighting purposes; and there is therefore less chance of carbonizing deposits than in the case of producer gas. There are two causes of premature ignition. If by any chance dirt is deposited in the engine cylinder and becomes red hot, this will fire the charge before the spark is produced—thus causing a pre-ignition. Premature ignitions are very dangerous, because of the great increase of pressure caused; and if they are allowed to go on, something must fracture. The only external evidence of premature ignitions is a slight shiver of the engine when the ignition takes place.

The back-fire, on the other hand, is perfectly harmless. It only means that one of the working charges has been lost. When the engine back-fires, it fires into the air-pipe. The cause is known as the smouldering ignition. If for some reason the charge does not completely burn, it smoulders all the way down the stroke instead of being completely burnt. Thus there will be some air and gas left behind in a pocket after the exhaust stroke; and when the next gas charge is admitted, it catches fire and fires down the open air-pipe, causing back-ignition. Back-ignitions are generally stopped by regulating the spark.

These are the principal defects which are likely to occur. I am, of course, leaving out all the simple mechanical defects—such as, for instance, those which arise from lack of oil. While considering the lubrication of the engine, I would like to say that the less oil admitted to the cylinder the better. It is much better to put the minimum rather than the maximum quantity, because there is a tendency for the oil to carbonize on the valves, which gives rise to considerable trouble. Makers allow from two to three times as much oil as is necessary to oil the engine. I have measured the oil; and 1¾ pints were used in the cylinder in a day of eight hours—the engine developing 115 H.P. The oil which is fed to the other parts of the engine should be filtered and used over and over again. If this is observed, the probable oil consumption of the engine will not exceed, in the case of an engine of 115 H.P., three pints in the day.

Let us consider the question of the large engine. This is really a very serious problem. I will take the case of a mill, preferably a paper or flour mill, because these run 144 hours per week, with a very steady load. In such cases the mills are almost invariably situated where it is impossible to get coal gas, and, moreover, if it were, a large engine cannot afford to generate power from the public mains; and producer plant must therefore be installed. I am not at the present moment going into the details of producer plants; but I shall assume that a producer plant is installed. Now a 500 H.P. engine is generally a two cylinder tandem engine, in which the troubles are far greater than in the case of a single cylinder engine, because the piston rod must be packed against the gas. This gas will contain one-tenth part of 1 per cent. of sulphuretted hydrogen, which unites with water at and above a certain temperature. This very quickly starts corrosion in the piston rod. When using blast-furnace gas, the absolute contrary obtains. I do not know why—evidently the dust is far less injurious. There is very little trouble experienced with the packings. They appear to lubricate themselves; and this is probably one of the reasons why the Germans have obtained so much success with their large engines, because nine-tenths of their gas-engines work on blast-furnace gas, whereas in our country three-quarters of the gas-engines are working on producer gas, which turns a rod into a dull colour, and causes the surface to be somewhat roughened. Again, a similar difficulty is met with in the bend of the exhaust-pipe. It is found that the metal in a bend in the cast-iron exhaust-pipe is frequently apt to be cut through by reason of the gases striking it being laden with sulphurous acid. Hence the necessity of adopting large radii of curvature for bends in the exhaust-pipe.

Granting that packing difficulties have been overcome, it will be necessary to consider the question of lubrication carefully. In the case of a small engine the question is not a very serious one; but in the case of a 500 H.P. engine running at 135 revolutions per minute, with a cylinder diameter of from 14 to 15 inches, the question becomes one of considerable importance. The large surfaces of metal are nothing like so easily lubricated as a 3-inch shaft. Moreover, in large gas-engines the enormous weights of the fly-wheels must be considered. In case of accident, a small engine can be stopped in a minute or two, but a large one will probably require a quarter of an hour, on account of the energy of its fly-wheel. It is therefore an important matter to have automatic lubrication.

In the case where gas-engines are standing over the week-end, very great care must be taken to prevent the frost getting in. All gas-engines should be provided at the lowest points with proper cocks, so that the water-jackets may be completely drained out during bad weather.

It is important to remember that the success of the gas-engine to a very great extent depends upon these minor items. It is these minor items that are thought least about, but which cause the major amount of troubles.

Status Prize of the Society of Engineers.—We learn from the Secretary (Mr. A. S. E. Ackermann, B.Sc.) that the Council of the Society of Engineers may award in the present year two premium of books or instruments to the value of £8 8s. and £4 4s., as first and second prizes respectively, for approved essays on the subject of "How to Improve the Status of Engineers and Engineering, with Special Reference to Consulting Engineers." The competition is open to all; but application for detailed particulars should be made to the Secretary, at 17, Victoria Street, Westminster, S.W., before entering. The last date for receiving essays is Friday, May 31.

Manchester District Institution of Gas Engineers.—The forty-second annual meeting of the Institution will be held next Saturday, at the Midland Hotel, Manchester. According to the programme issued by the Hon. Secretary (Mr. W. Whatmough, of Heywood), the business will include the presentation of the annual report and accounts, and reports of the Commercial Sections and the Committee on the Gas-Fitters' Education Scheme. The retiring President (Mr. Robert Watson, of Doncaster) will induct his successor, Mr. Samuel Glover, of St. Helens, who will deliver his Inaugural Address. At the close of the proceedings, the members will take tea together, and the new President will afterwards hold the usual reception.

CHEMISTRY OF GAS.

Lecture by Mr. S. Field.

The fifth of the course of lectures on Illuminating Engineering at the Northampton Polytechnic Institute, St. John Street, E.C., was delivered last Tuesday evening. The second of the series has been the only previous one of special interest to "JOURNAL" readers; and this (which was on "Photometry and Light Measurement," by Mr. A. C. Jolley) was noticed on p. 273 of the issue for Jan. 30. Then followed two lectures upon the "Production of Electric Light and Its Distribution;" and these were succeeded last Tuesday by Mr. S. Field, A.R.C.S. (a member of the staff of the Institute), who dealt with the "Chemistry of Gas Manufacture and Lighting." The subject was treated in a lucid manner, and interest was enhanced by the inclusion of a number of practical experiments and a selection of lantern slides. It is to be regretted, however, that the audience which faced Mr. Field was of such meagre proportions as would assuredly have proved disconcerting to a less experienced lecturer. The hope may be expressed that the rest of the course will be more adequately supported.

In the, comparatively speaking, brief space of an hour-and-a-half, Mr. Field managed to cover a great deal of ground. After remarking that the chemistry of gas manufacture and gas lighting must be regarded as a highly important branch of the subject of illuminating engineering, he said that gas lighting was now more than a century old. It was in 1792 that Murdoch first used gas for purposes of illumination in his house at Redruth; and when he went to Birmingham, he put up apparatus at the Soho Foundry for manufacturing gas on a small scale. About 1804, Winsor gave a series of lectures in the Lyceum Theatre; and some years later the theatre was lit up by gas. The Chartered Company was incorporated in 1812; and in 1813 Westminster Bridge was provided with gas-lamps. From that time onward, the development of gas lighting and manufacture proceeded apace; and that it was now an industry of vast magnitude was shown by the Board of Trade Returns. It appeared that there were some 794 authorized gas undertakings in the United Kingdom; and that the amount of coal carbonized by them in a year exceeded 15 million tons. The production of gas from this was nearly 200 million thousand cubic feet, which was distributed to over 6 million consumers. Gas could not, therefore, be regarded as a dying industry; and, as a matter of fact, in spite of the competition of electricity, the recent improvements in gas lighting had enabled it to well hold its own. A science and an industry of this magnitude could not, of course, be thoroughly dealt with in a short lecture; and he could only attempt to touch on a few of the salient features.

A number of slides were then thrown upon the screen, with the object of furnishing a rapid survey of the process of gas manufacture. First, there was a complete gas-making installation; then a coal-test plant; and afterwards the different portions of the apparatus were illustrated separately. Mr. Field remarked that the composition of a coal gave no direct clue to its utility for gas-manufacturing purposes; and therefore, in order to ascertain the value of a coal from this point of view, it was customary for a small charge to be put through the complete process. He quoted the following as the products from a sample of gas coal. Gas, 22·25 per cent.; ammoniacal liquor, 9·5 per cent.; tar, 8·5 per cent.; and coke, 59·75 per cent. The composition of crude coal gas was: Illuminants—Ethylene, propylene, and butylene. Diluents (heating constituents)—Methane, hydrogen, and carbon monoxide. Impurities—Carbon dioxide, ammonia, cyanogen, carbon disulphide, sulphuretted hydrogen, oxygen, and nitrogen. There were also exhibited tables to show the effect of temperature and time on the products of distillation.

As to candle power, the lecturer said, quite a number of conditions operated together to vary this. It was at one time thought that the illuminating power of coal gas was almost solely due to the ethylene, propylene, and butylene; but that this was not the case could be easily shown from the fact that while 4 per cent. of ethylene and 96 per cent. of hydrogen should give an illuminating mixture, a mixture of 10 per cent. of ethylene and 90 per cent. of hydrogen gave a non-luminous flame. The volumes of gases required to render 1 volume of coal gas non-luminous, Mr. Field gave as follows: Oxygen, 0·5; carbonic acid, 1·26; air, 2·27; nitrogen, 2·3; carbon monoxide, 5·11; hydrogen, 12·4. The luminosity was due to the combined effect of different constituents. The chemistry of the combustion of coal gas was essential to consider; and it must be remembered that in any ordinary coal-gas flame one did not get complete combustion straight away. With regard to the importance of the temperature of combustion, he pointed out that every combustible material had a minimum below which it would not burn at all. This was called the ignition-point. What was necessary to aim at was complete combustion. In the case of a candle-flame or a gas-flame, the luminosity was not due solely to the carbon, but was largely dependent upon the heating constituents; and therefore the calorific power of a gas must have some relation to its candle power. This led one to study the heat value of the different constituents of gases. The calorific power of the heating constituents could be determined; but this did not indicate at once the temperature they were going to add to any particular flame. For instance, hydrogen gave off water which in the calorimeter was retained, but in a gas-flame was dispersed in the form of steam. This explained the difference between the gross and the net calorific values; and it was, of course, the net value that should be taken into consideration. In the case of carbon monoxide, there was no latent heat to take into account, and so the gross and net figures were the same. Professor Lewes had shown that, taking a number of results, the candle power increased with the calorific power. Of course, there was not necessarily any direct relation between the two; but if one knew the candle power of a gas, it was possible to ascertain approximately its calorific value.

The next point dealt with was the temperature developed in flames. With the advent of the incandescent mantle, Mr. Field remarked, the production of temperature was everything; and the subject was one which could be illustrated by simple calculation. The constituents of coal gas had their definite calorific value; but temperature depended upon a number of conditions. These were: (1) Calorific power; (2) mass of products; (3) specific heat of those products. If carbon was burnt in its theoretical amount of oxygen, the calculated temperature would be something like 10,000° C.; and if it was burnt with its theoretical air, this came down to about 2700° C., and with twice the theoretical air to about 1400° C. In spite of the fact that hydrogen had a far higher calorific value, it could not develop anything like so great a temperature, because carbon produced a smaller mass of products, with less specific heat. Hydrogen burnt with its theoretical oxygen would give about 6720° C. These temperatures, while hypothetical, clearly indicated important principles.

The final point dealt with in the lecture was the structure of flames. A flame had been defined, said Mr. Field, as the region in which gaseous materials burn. Combustion took place in stages; and flames could be divided into several zones or regions. The structure of a bunsen flame was demonstrated by means of a flat piece of gauze. When the gauze was placed in one portion of the flame, a red-hot circle appeared—showing that there was a cool space in the centre of the flame. When, however, the gauze was placed in a higher portion of the flame, the whole of the gauze exposed to the flame became red—this showing that the cool inside portion of the flame had disappeared at that stage. A match-head was also placed in the centre of the bottom of the bunsen flame, and was then gradually lifted; and it was proved that it would not ignite until it had been raised an appreciable extent. Other experiments having afterwards been carried out to further demonstrate the structure of flames, the lecturer went on to say that ordinary coal gas required for its complete combustion from 5 to 6 times its volume of air. In an ordinary bunsen gas-flame which was slightly luminous, the relation of gas to air was about 1 : 2·2. In the non-luminous flame, the proportion of air was 2·3 volumes to 1 volume of gas. With 2·6 volumes of air, the flame began to roar. In experiments with a thermo-electric pyrometer a maximum heat of 1770° C. was found in a bunsen flame. So as to obtain a high temperature for incandescent gas-mantles, the mantle was placed in the hot envelope of the flame. The securing of the best results did not depend upon the quantity of gas that was consumed, but upon the adjustment of the flame so that the mantle was in this hot envelope.

There were on view a large number of samples of the bye-products of gas manufacture, presented by the Gaslight and Coke Company; and in closing his remarks, Mr. Field drew attention to the fact that the application of the principles which had been briefly dealt with by him would be treated more fully in the final lecture of the series—that by Mr. Goodenough, on the "Practical Use of Gas-Lamps."

MODERN LIGHTING PROBLEMS.

The concluding lecture of the series on Illuminating Engineering being delivered at the Regent Street Polytechnic by Mr. J. S. Dow took place last Thursday.

The lecturer explained that he now proposed to deal generally with the lighting of private houses, libraries, shops, streets, and other practical problems, illustrating each point, as far as time permitted, by means of lantern slides. Naturally, in any interior the fundamental rules of good lighting referred to in previous lectures held good. In every case one had to consider first the purpose of the room and scheme out the position of the lights, select the candle power, variety of reflector, &c., accordingly.

The lighting problem which perhaps interested us most nearly was the illumination of private houses. However, even in this section many distinct problems were met. Old and historic mansions, newly converted from candles to gas or electricity, naturally could not be treated in the same way as a "bijou residence." Æsthetic condition often prevailed over utilitarian ones, and there were also frequently special problems to consider—such as the illumination of old tapestries and pictures. In small houses, again, much depended upon the taste of the occupant. In a library or study, or any other room in which children did their home lessons, good light was particularly essential. In a dining-room, it was usually considered desirable to illuminate the central table strongly by means of a well-shaded lamp, and to leave the background in comparative obscurity. In a drawing-room, people usually preferred a soft and rather dim light for conversation, but might also require sufficient flexibility to convert this into a very bright illumination for occasional festive gatherings.

As a rule, the illumination of kitchens, bedrooms, and passages

was apt to be poorly treated. A lady, particularly, liked to be able to get a strong general illumination in a bedroom; and this could not readily be done only by the special lights over the dressing table. In the kitchen, the needs of domestics were often not sufficiently appreciated. The grate, the dresser, and the central table where sewing or reading is done, should receive plentiful light—for some kinds of sewing, general illumination was hardly enough, and strong local illumination from near shaded lamps was requisite.

The lecturer then passed on to the consideration of public libraries, pointing out the marked distinction to be drawn between the conditions of light required in a lending library, a reference library, and a general reading-room. In a reading-room, bright and cheerful general illumination was usually aimed at; but in the reference library or students' section, local table lamps and subdued general lighting were preferred. Mr. Dow then proceeded to show lantern slides illustrating the conditions met with in a number of well-known London libraries. He pointed out the defects in various kinds of shades in common use for lighting tables and shelves, and recalled the discussion on this subject before the Illuminating Engineering Society last year. In this discussion, a minimum reading illumination of 3½ foot-candles was considered as desirable; but in certain kinds of work—oriental manuscripts, parchments, &c.—it might be desirable to go considerably higher than this.

Mr. Dow then proceeded to show a variety of slides illustrating office and other forms of lighting. These included a specially prepared set lent by the British Thomson Houston Company, showing their "Eye-rest" system of lighting. This consisted in tungsten indirect lighting; the lamps being usually concealed in substantial hanging receptacles, often with considerable decorative effect.

The next subject mentioned was shop lighting. Mr. Dow pointed out how the aims of shops in different localities necessarily differed according to the class of customer catered for. In some cases, mere brilliance was aimed at as a means of attraction. The tendency of bright lights to attract people had a certain justification; but he deprecated using distressingly bright lights in the windows themselves among the goods. Such lights only prevented people seeing the things they had come to buy. If bright lights were needed to attract custom, they should be so placed as not to interfere with comfort in studying the window at close quarters. On the other hand, if the light was wisely used, it was not easy to over-illuminate a show-window, and from 10 to 30 foot-candles was often obtained in practice.

Mr. Dow next threw on the screen a number of slides illustrating different styles of shop and window lighting. Some of these (lent by Mr. T. E. Ritchie) showed the use of indirect arc lighting; others illustrated the use of concealed lights. The lecturer spoke with special approval of the deck-lighting system, in which the lamps were placed above the window in a separate compartment above frosted glass panels. The method was readily applicable to flame arc lamps and powerful incandescent gas-lamps; for the lamps could receive attention without the window being disarranged, and, being entirely separated from the goods in the window, there could be no question of any effect of fumes or products of combustion on delicate fabrics. Window dressing and window lighting, the lecturer suggested, ought to be considered together. He quoted the example of certain Berlin shops, in which alternative systems of lighting were provided; and a "rotating window" device had been contrived, enabling one model-window to be dressed while another was on show. In conclusion, it was pointed out that the best-class shops now aimed at showing in their windows only a few choice samples; they did not regard them as inventories of the inside of the shop. If a window was filled with heterogeneous articles, artistic lighting was considerably hindered.

Passing on to factories, Mr. Dow laid special stress on the interest now being taken in the subject by hygienic authorities. He quoted some of the evidence of the recent Departmental Committee on Accidents in Workshops as showing how mishaps were constantly caused by imperfect illumination. Holland had long ago paid special attention to the legislation on workshop-lighting; France had newly appointed a State Committee on the Hygienic Aspects of Lighting; and it was hoped that before long our own Home Office would take steps to form a similar committee. Meanwhile, next May would see the first international congress in Milan on the Prevention of Industrial Accidents; and it was hoped that illumination would play an important *rôle* on that occasion. Mr. Dow also spoke of some special difficulties met with in factory lighting, and pointed out that, in scheming out the lighting of certain works, it was necessary to enter as fully as possible into the nature of the business and foresee the special calls that the illumination would have to meet.

The subject of railway lighting was next briefly dealt with; some of the excellent photographs of tube railways recently shown at the Illuminating Engineering Society being explained to those present. The lighting bill of even a small railway would be at least £50,000 per annum. On the tubes, the matter was of special consequence, as they received no daylight at all.

In conclusion, the lecturer briefly traced the development of street lighting. He pointed out how the original function of street-lamps was to aid the police in preserving order; but nowadays we had other matters—notably the speeding-up of traffic—to consider. Some slides lent by the Gaslight and Coke Company, showing streets lighted by high-pressure gas, and some typical examples of flame arc street lighting were shown. Apart from the provision of adequate uniform illumination, it was becoming increasingly realized that one should take special measures to modify the tendency to dazzle of modern sources of great brilliancy. He had before him an extract from a book, "The King's Highway," by Mr. Reginald Ryves, in which special stress was laid on this point. Mr. Ryves deserved credit for appreciating the need for a more scientific method of road illumination some years ago, when these matters were less thought of than at present. Mr. Dow then referred briefly to various attempts to modify polar curves of illuminants, so as to improve the uniformity of illumination in streets, explaining the Excello dioptric globe, and the special reflectors devised by Clayton Sharp and others. He made special reference to the painstaking researches of Mr. Sweet in the United States, who had endeavoured to find a connection between desirable height of lamps, and distance apart, correct polar curve of light distribution, and mitigation of glare. Allusion was also made to Mr. Haydn T. Harrison's papers on this particular subject, and his work on the design of street lighting reflectors.

As a final illustration of the opportunities for improvement in street lighting, the lecturer referred to the recently accepted combined scheme of gas and electric lighting in the City, by means of which a saving of over £6000 per annum, and yet an increase of about 600,000 rated candle power, was expected to be obtained.

A MISPLACED FLUE-PIPE.

The recent case of the suffocation of two servants at Beckenham by the discharge of the products from a gas-heated conservatory stove into a bedroom points to the necessity of the fixing of such arrangements being carried out by qualified men, and not by men who have had no special experience or technical qualification for the work.

The only point about the occurrence over which there is room for any congratulation is that it is unique in its circumstances; and that, in the course of long and wide experience of gas-heating, so far as our knowledge goes, there has been nothing in character similar to this tragic affair. In the first place, the flue from the gas-heated conservatory stove had been carried up the side of the house, and led and discharged into the chimney of the servants' bedroom, just by the register of the bedroom stove. Naturally, under such circumstances, if the register was open, every chance of admission to the room was offered to the products of combustion. The register appeared to have recently been slightly opened, as dust and dirt were displaced. No fitter properly trained in the installation of gas-heating appliances (men employed by a firm of builders did the work in this instance) would have allowed the emission of the products of combustion at such a dangerous point as was done in this case. There are further aspects that are highly regrettable. The medical testimony showed that, if there had been ventilation in the room, the two women could have gone on breathing the carbon dioxide with impunity for some time. Instead of there being any ventilation, the window and door were closed, and the chimney register was only slightly raised, just sufficient to allow the products of combustion to escape into the room in the manner described. Without ventilation, two women were sleeping in the room, which was electrically lighted. Only a few days before, they had complained of faintness in the morning; but even then they did not provide themselves with ventilation. Had they done so, this case of suffocation, traceable to improper flue-pipe fitting, could not have occurred. If the conservatory gas-stove had been suspected, and the Gas Company's officials consulted, the discovery of the misplaced outlet would have led to rectification, and thus this fatal occurrence would have been averted.

Every-Day Uses of Portland Cement.

We have received from the Secretary of the Associated Portland Cement Manufacturers (1900), Limited, of Portland House, Lloyds Avenue, E.C., a volume bearing the above title. It is the second edition of a work originally published three years ago, when it was received with so much favour that the preparation of another edition had to be undertaken much earlier than could have been foreseen. The ever-increasing popularity of portland cement, and the application of it to fresh uses, called for the addition of a quantity of new matter which more than doubled the size of the book, the contents of which now occupy 326 octavo pages. After a short introduction, the subject of the quality and testing of portland cement is taken up; and subsequently sections of the book are devoted to "Aggregates," "Workmanship," and "Concrete." The last subject is dealt with very fully; a number of examples of the uses of concrete (some of them uncommon) being given. In this portion of the book will be found particulars in regard to gasholders, water reservoirs, tanks, and wells. The text is amply illustrated; and it is followed by an index and a glossary. Portland cement was first made on a truly commercial scale in Kent about ninety years ago; and the pioneer firms have been incorporated, with others, in the Association who have brought out the interesting work under notice, the net price of which is 1s. 6d. in paper covers or 2s. 6d. in boards.

GASHOLDER FOUNDATIONS IN SOFT SOILS.

The following article, prepared by Mr. HUNLEY ABBOTT, Assoc.M.Am.Soc.C.E., for the "American Gaslight Journal," appeared in a recent issue of that publication.

A gasholder foundation must support a load distributed over a large area, where any unequal settlement will cause leakage and failure of the steel tank. Consequently, this part of the structure must be designed with special care. The steel tank has been found to be from 33 to 50 per cent. cheaper than the concrete or masonry tank built in after an excavation of 30 to 40 feet. With the steel tank, however, it is important that the top of the foundation should be above the ground-water level to prevent corrosion. Before describing the foundations of the gasholder of the New Haven (Conn.) Gas Company, it will be of interest to refer to the cost and character of several other gas-tank foundations.

The handbook of "American Gas Engineering Practice," by M. Nisbet Latta, says: "The Stacey Manufacturing Company cites a recent instance of a holder (about 1½ million cubic feet capacity), erected upon soft ground, at a cost, for wooden piling, of 75 c. per square foot over the whole area of the same. These piles were capped with 2 feet of concrete; but the foundations failed immediately upon the filling of the holder tank with water."*

Mr. C. A. Learned described, in an article entitled "A Holder Foundation on Quicksand" in the "American Gaslight Journal" for Feb. 24, 1902, the foundation of a holder 115 feet diameter and 103 feet high, holding 700,000 cubic feet of gas, and carrying a total weight of 9100 tons. The soil conditions were as follows: Five feet of loam on top, then a thin layer of cemented gravel, and quicksand below that to a considerable depth. The foundation site was excavated down to the layer of gravel, and a concrete wall 5 feet high was constructed round the circumference of the holder. Inside this circular wall was placed compacted gravel and sand, and the whole capped with a 12-inch slab of concrete. The estimated cost of this foundation is 90 c. per ton of load carried; but, from the unit costs given by Mr. Learned, it is quite probable the foundation would cost at least $1·10 per ton of load carried to-day. No piles were used in this construction.

In the issue of "Engineering News" for Oct. 26, 1905, a typical gasholder was described. The tank was 195 feet in diameter and 39 ft. 3 in. high, holding 8,712,200 gallons of water. The total load on the foundation was something under 60,000 tons. "To construct the foundation, 4100 wooden piles were driven and capped, first with 12 in. by 12 in. timbers, and then with 6 in. by 12 in. planks, placed tight. On this capping was laid a circular brick wall 5 ft. 6 in. thick and 8 feet deep, having an outside diameter of 199 feet. The space within this wall was filled to within 18 inches of the top with gravel, washed and rolled; the remaining 18 inches being filled with concrete, on which the steel bottom of $\frac{5}{16}$-inch plate was constructed." The estimated cost of this foundation is about $1·50 per square foot, and about 80 c. per ton of load carried.

"Engineering Record" for Dec. 23, 1911, contained an article describing the foundations of a 10-million cubic feet holder, in New York City, located on the banks of the Harlem River [see *ante*, p. 366]. This foundation consisted of a circular horizontal reinforced concrete platform 4 feet thick and 258 ft. 3 in. in diameter, supported on the ground and on an annular concrete foundation wall, extending down from 5 to 45 feet to rock. This wall was 5 feet thick for the first 15 feet of its height; and below that it was increased to 10 ft. 7 in. From the data given, the cost of this foundation must have been about $1 per ton of load carried.

A gasholder recently built by the New Haven (Conn.) Gas Company provides storage capacity of more than 3 million cubic feet, at 7½ oz. pressure; and the guide-framing will have a height (above the foundation) of 206 feet. The diameter of the smallest of the five sections of the holder will be 149 ft. 10 in.; each section being 34 feet deep. The tank is 163 feet diameter and 35 ft. 3 in. deep, with the bottom plate ⅜-inch thick excepting a ½-inch outer course; the side plates and fixed courses grading from 1⅛-inch thickness at the bottom to ⅜-inch thickness for the upper course. The tank will hold practically 5 million gallons of water, and, together with the weight of this water and the weight of the rest of the structure, the aggregate load upon the foundation is calculated at 30,000 tons.

Before proceeding to describe the foundation of this holder, it will be of interest to point out the original plans, and to note the great economy effected by the use of the type of foundation finally chosen, the cost of which was about 59c. per ton of load carried. The first plan (based on the use of wooden piles) is shown in fig. 4. After excavating below the water-level, piles were to have been driven, cut off, and capped with concrete, on which the tank was to rest. Surrounding the tank was to be a retaining wall, as shown. The bottom of the tank would have been considerably below ground-level; and thus, apart from the item of the cost of this type of foundation, a serious drawback would lie in the fact that the tank would be subject to the corrosive action of drainage water. The type of foundation as actually used consisted of pedestal concrete piles, formed in the ground with large bases; the concrete slab at the surface of the ground being well above ground-water level.

Years ago, the site of the foundation was a sandy beach over which a layer of mud increasing to 12 feet in thickness had been deposited, with a fill over the mud of from 4 to 5 feet of loose earth. The fill had been in place for a number of years. To the west of the site of the holder runs a street, and on the east of the site run the tracks of a railroad. The original surface of the ground sloped off from the street to the railroad track with a drop of about 10 feet.

A plan of the foundation is given in fig. 1. The site was first brought to a level grade, the cut on the up-side being used as a fill on the lower side, and the surface thoroughly compacted by a steam-roller. Over the whole area of the foundation piles were then driven, on 5-feet centres, in all directions (as shown in the diagram). In all, 966 were formed, each one to carry a load of 31¼ tons. The piles were of varying length, the casing and core used in the formation being driven down to the subsoil a sufficient distance to ensure the enlarged foot (which is bulged out in the process of making the pedestal pile) being thoroughly embedded on the sand subsoil. The pile columns are 17 inches in diameter, with enlarged footings about 2 ft. 6 in. to 3 ft. in diameter. The pile lengths vary from 10 to 30 feet.

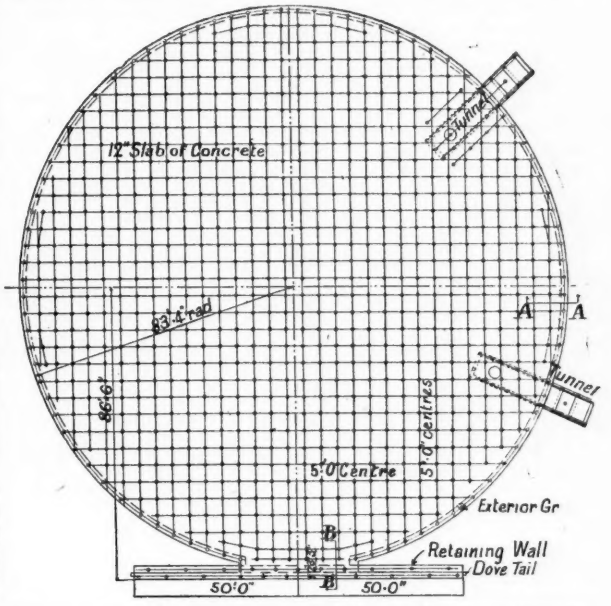


Fig. 1.—Foundation Plan for Gasholder for the New Haven (Conn.) Gas Company.

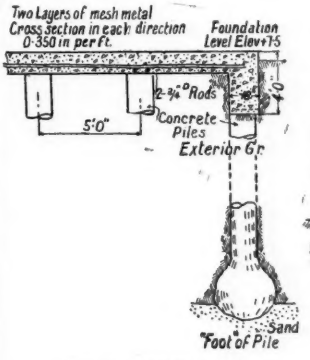


Fig. 2.—Section at A A.

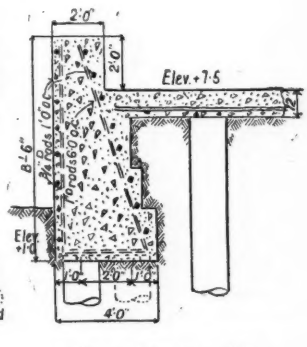


Fig. 3.—Section at B B.

The piles were all cut off at a given elevation, and two ¾-inch square twisted rods were run over the tops of each line of piles in both directions. Over these rods were spread two layers of 2 in. by 12 in. mesh, ¼ inch diameter, Clinton wire cloth, run in opposite directions, making two complete sheets of mesh metal over the whole foundation area. These rods and the cloth formed the reinforcing for the concrete slab disc 12 in. thick and 66 ft. 8 in. in diameter, completely covering the tops of the piles. At the outer edge of this disc is a concrete girder, 18 inches wide and 3 feet deep, reinforced with two ¾-inch square twisted rods. This girder stiffens the slab on its edge where the steel tank superstructure rests; and it also goes into the earth deep enough to prevent any lifting action from frost. All the concrete for piles, slab, and girder was a 1 : 2 : 4 mixture, using Alsen cement. The general lay-out of the piles may be seen in fig. 1; and the details of the slab and girder construction are shown in fig. 2.

* In a letter to the "American Gaslight Journal" for the 5th inst., Mr. James E. Stacey, the President of the Company referred to, denies that his Company ever designed either a foundation or a tank that failed. Furthermore, he says the Company never erected a tank upon a foundation built or designed by any of their customers that failed. The designing of a foundation for a tank to meet any condition is a very simple problem. Failure is due to disregard of plans and specifications by unscrupulous sub-contractors and inefficient supervision.

On the side of the holder next to the railroad tracks the elevation of the foundation is about 4 feet above the base of the rail, and therefore a concrete retaining wall 100 feet long was constructed tangent to the foundation disc and parallel to the tracks. A section through this wall at the point of tangency is shown in fig. 3. The wall is 4 feet thick at the base, 2 feet thick at the top, and 8 ft. 6 in. high. The pressure on this wall is, under ordinary circumstances, only that due to the action of the earth which it retains; but, owing to the possibility of a shock from derailment or other accidents along the adjacent railroad, steel reinforcing rods were placed as shown.

On the north side of the foundation are two tunnels to carry the 30-inch inlet and outlet gas-pipes. These tunnels are 37 ft. 9 in. long, and project under the holder foundation 24 ft. 4 in. The inside cross-section is 6 ft. by 6 ft. The bottom and sides are of concrete 12 inches thick, and the reinforced concrete foundation slab forms a roof to the tunnel. The roof is further strengthened by 15-inch I-beams at 4-feet intervals along its length. At the outer end of the floor of the tunnel is a 4 ft. by 6 ft. pit 2 ft. 9 in. deep, in which is the cut-off valve.

The top surface of the foundation slab on which the tank rests was made level with a variation of not more than ¼ inch over its whole area, and an annular band round the outer circumference of the disc about 10 feet in width, and made level to not more than ¼-inch variation. The top of the disc or slab was then covered with a mixture of dry cement and sand in equal parts, and the steel tank lowered upon this 1½-inch layer. The cushion of dry cement ensures a uniform distribution of the load of the tank to the surface of the slab. In time the cement will harden by the moisture in the air, and will form a permanent foundation, taking up any irregularities in the tank, and thus ensuring an even distribution of the load over the whole foundation. The cost of the pile foundations was about 59 c. per ton of load carried; and the cost of the reinforced slab about 44 c. per square foot.

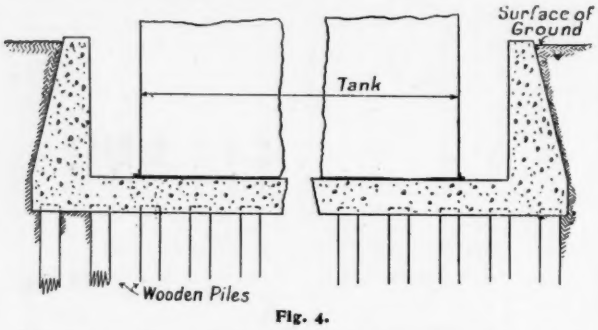


Fig. 4.

There remain to mention some features concerning the construction of the gasholder which will be of interest. A novel use will be made of the tank water as a cooling medium for the hot circulating water from the neighbouring condensers, and the warm circulating water will assist during the winter to prevent freezing.

The holder sides of all five lifts are composed of twelve courses; the eight intermediate courses between the two upper and the two lower rows being of No. 10 B.W.G. steel. The double-riveted spherical crown of the inner lift comprises 633 plates in thirteen courses, concentrically arranged around a 72-inch diameter centre-plate, 1½ inches thick; the nine intermediate courses adjoining the first course from the centre plate being of No. 9 B.W.G. steel. Each lift is provided with twenty top carriages, equipped with adjustable radial and tangential rollers, and forty bottom rollers, which maintain the vertical alignment of the holder sections during the operation of telescoping.

The plate girder standards of the guide-framing, which resist the wind loads and strains transmitted by the carriage rollers, are connected by six tiers of latticed box girders, and reinforced by diagonal bracing and tie-rods. Each standard, which is 171 feet in height, built up in three sections, tapers from 40 inches in width at the base to 26 inches at the top.

To ensure thoroughly gas-tight connections throughout, the light as well as the heavy plates were caulked during the erection stage, so that very few, if any, leaks will have to be closed when the holder is tested. The caulking of the light sheets while assembling ensured metal-to-metal joints; and it is the most recent practice in gasholder construction—superseding the use of oxidizing agents or of inserted fillers at the seams.

The method of hoisting the guide-framing members in position was on the floating derrick principle—utilizing the buoyancy of the holder sections when partially inflated with air to regulate the working height of the erection equipment. A rotating trammel derrick, pivoted on the central crown plate, with the opposite end of its radius arm carried on a circular track on the outer course of the crown, and an adjustable boom overhanging the side of the holder, were used to raise the materials into position. The lower section of the guide-framing, which is 60 feet high above the tank "walk-round," was erected complete while the holder was down; and it will maintain the vertical alignment of the lifts when inflated to the proper working height for raising the middle section parts into position. An eccentric load of about 8 tons will be sustained in this manner when the middle standards, weighing 4 tons each, are being erected.

SCOTTISH JUNIOR GAS ASSOCIATION.

EASTERN DISTRICT.

Visit to the Granton Gas-Works.

On Saturday afternoon, about seventy of the members of the Eastern District section of the Scottish Association paid a visit to the Granton Gas-Works of the Edinburgh and Leith Gas Commissioners. They were received by Mr. Alexander Masterton, the Engineer and Manager, and were divided into groups, each being taken through the different sections under the care of an official or a foreman. As the works have already been fully described in the "JOURNAL," and particulars given of the new machinery and apparatus which has from time to time been introduced, detailed reference is unnecessary. The visit was one of inspection; and, as one of the speakers at the tea which followed said, he was not worth his salt who could not be the better after spending the afternoon looking over such thoroughly modern and up-to-date gas-works.

To the visitor who had not been to the works since Mr. Herring ceased to have sole personal charge of them, the first natural desire was to look for any changes that had taken place. But in this respect there were none. Just as when Mr. Herring was in position, everything goes like clockwork; and the visitor was struck with the entire absence of fuss and bustle throughout all the departments, and with the ease and smoothness with which the work was being carried on. An atmosphere of well-understood discipline pervaded the establishment; and the cleanliness and orderliness apparent everywhere over the vast area covered by the works, make them what they are—a model of their kind.

The visit lasted for about a couple of hours; and everything, from the steam coal-breaker and the hydraulic tipping of the coal-waggons to the continuous vertical retort—the latest "baby" at Granton—was open for inspection. Indeed, as was subsequently remarked, there was no concealment. The whole of the works and the wealth of mechanical detail and labour-saving appliances were freely shown; and, where necessary, expert explanations were cheerfully forthcoming. The last stage of the visit comprised the products works.

At the close of the inspection, the company assembled in the technical office, where, under the chairmanship of Mr. Masterton, tea was served.

The PRESIDENT (Mr. John R. Moyes), in a brief speech, said how much the members had enjoyed their visit, and how greatly they were indebted to the Gas Commissioners for kindly throwing the works open to their inspection. He also thanked Mr. Masterton and his assistants for the help they had given them.

Mr. MASTERTON, in the course of his reply, said it was a great honour and pleasure to him to have had a visit from the members of the Eastern District; and he trusted they had all learnt from it something which would be useful to them, either at the present or in the future, and that they would leave the gas-works with the feeling that they had been the gainers in experience by the visit. Mr. Geddes, the Secretary, had kindly placed in his hands a few points, from which he was very pleased to learn that the membership of the Association showed signs of steady increase, and that the number now stood at 99. It was a pity it was not 100. He was also glad to learn that the meetings were all well attended; and it was gratifying that there were such a number of interesting and instructive lectures delivered and papers read at them by many of the best-known gas engineers in Scotland. As showing the benefit of such an Association as theirs, he mentioned that five out of eight of their Presidents were now the engineers and managers of fair-sized gas-works. He strongly recommended all the juniors to join the Association, as by so doing they would receive excellent experience and instruction, be able to discuss difficulties with their fellow-workers, and have opportunities of understanding the methods pursued in different works. He concluded by wishing every success to the Eastern District Section of the Scottish Junior Gas Association. He trusted its prosperity would continue, its membership increase, and its beneficial influence extend. He wished the members all individually good luck and prosperity in their several callings.

Mr. HENRY O'CONNOR, at the request of Mr. Masterton, offered a few encouraging remarks. He cordially endorsed all that Mr. Masterton had said about the Association, and emphasized the educative value of such visits as the one the members had just paid. The man who could not find something to learn from such an afternoon's experience as they had had was not worth his salt. He emphasized the practical value of these visits, and mentioned that when he commenced his lectures in the Heriot-Watt and Glasgow Technical Colleges, he arranged for the students to visit the different gas-works. Members had to thank Mr. Masterton for enabling them to see everything on the works; and he was sure they had all learnt a great deal.

The HON. SECRETARY (Mr. W. Geddes) announced that the next meeting would be held at Dunfermline on the 9th prox., when they would have a lecture by Mr. Waddell, which would be followed by a discussion.

This concluded the business; but before the party separated, three of the members contributed songs and a recitation.

The whole of the day's experiences were of a most interesting and highly instructive kind; and Mr. Masterton and his staff were at great pains to enable the fullest possible educational results to be obtained by all present.

HIGH-PRESSURE GAS IN OUTLYING DISTRICTS.

By JOHN KENNINGTON, of Grimsby.

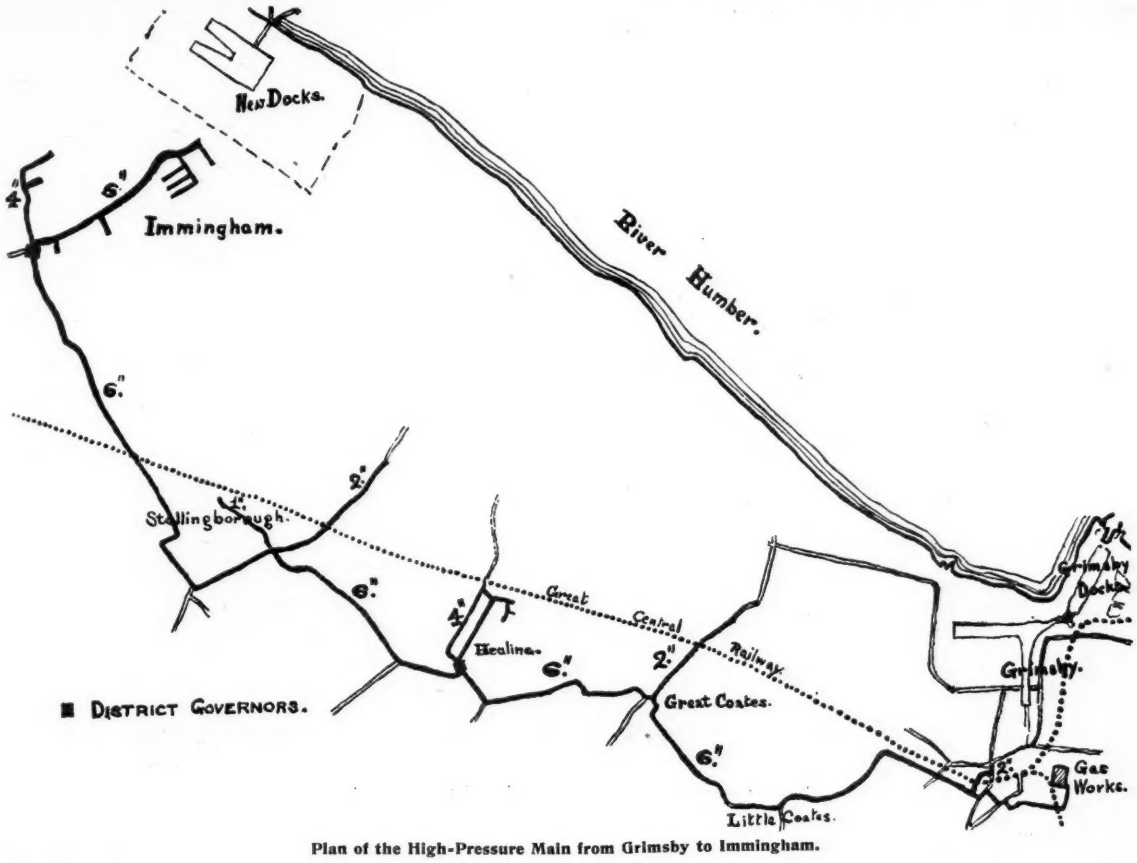
[A Paper read before the Yorkshire Junior Gas Association last Saturday.]

On being asked by the Secretary to give a paper, it occurred to the writer that, as the records of the Association do not contain a contribution on high-pressure transmission or supply, a description of the plant and mains recently laid down for the purpose of supplying gas to Immingham (an outlying suburb six miles from Grimsby) would be of interest.

When the question of supplying this new district with gas was considered, three schemes presented themselves: (1) Extending the existing low-pressure system. (2) Erecting gas-works in the new area. (3) High-pressure transmission. The first was struck out as being impossible; and the second would have necessitated the expenditure of a large sum of money from which no adequate return would have been obtained for a number of years. The third was adopted by reason of its moderate cost and its elasticity, as it is anticipated that still more distant districts will be supplied from the same main in the course of a few years. Another important reason was that there was ample room for an extension of plant at Grimsby. In arriving at this decision, free use was made of the records of high-pressure work brought over from America, and presented to the Institution of Gas Engineers by Mr. R. M. Searle.* These records are worthy of perusal.

The next questions to decide were the size of the main, and the extent to which the gas was to be compressed. The choice lay between a 4-inch main at a comparatively high pressure, and a 6-inch main at the comparatively low pressure of 5 lbs. It was found that the higher cost of the large main more than compensated for the increased cost of compression necessary if a 4-inch main were used. Moreover, if Immingham develops into a large centre of industry, as is confidently anticipated, so soon as the delivering capacity of the main is taxed, a holder into which gas can be pumped during the full 24 hours will be erected there. This, in addition to securing a supply to Immingham during the lighting hours, independent of the running of the compressors, would postpone to a much later date the necessity of increasing the compressing plant. Another advantage was that the pressure at which the gas was pumped could be increased to 10 or 20 lbs. with a comparatively small additional outlay.

The following figures, showing the discharge from a 6-inch main 10¼ miles long at various pressures, are of interest, as they serve



Plan of the High-Pressure Main from Grimsby to Immingham.

to illustrate the adaptability of the scheme to present and future requirements:—

At 5 lbs. pressure	. . . . .	16,000	cubic feet per hour.
,, 10 ,,	,, ...	25,000	,, ,,
,, 20 ,,	,, ...	42,000	,, ,,
,, 40 ,,	,, ...	70,000	,, ,,

The terminal pressure in each case is 1 lb. per square inch.

THE COMPRESSING PLANT.

The compressors, two in number, made by the Bryan Donkin Company, of Chesterfield, are of the rotary type, and each is capable of pumping 20,000 cubic feet of gas per hour against a pressure of 5 lbs. per square inch, at a speed of 125 revolutions per minute. The compressors are fitted with forced lubricators, which automatically lubricate all internal working parts. One machine is actuated by a direct-coupled horizontal steam-engine; and the other by a "National" gas-engine, to which it is geared. This arrangement was made to prevent a total cessation of pumping in case anything serious happened to the steam supply. The compressors are so arranged that one or both may be run at the same time. The engine and compressor in each set are mounted on a cast-iron bed. The plant is also fitted with an excess pressure-valve, which is weighted so that the gas is not compressed beyond the point necessary—viz., 5 lbs.

When the plant was brought into use, it was found that the gas-driven compressor would not start against a pressure of 2½ lbs.; the pressure being too great to allow the engine to move. This difficulty was overcome by making a small bye-pass connection, on which there is a cock, from the outlet to the inlet. The inlet-valve and bye-pass are opened to allow the engine to start-up; and as soon as it reaches its maximum speed, the main outlet-valve is opened and the bye-pass closed. Prior to this arrangement being put down, the contractors had not supplied plant to work under such conditions. No doubt such a combination would be, in future, supplied with a friction clutch, so that the compressor could be put in action when the engine got up speed.

The compressors are situated in the exhauster-house, and are attended to by the engine man on duty; no extra labour being entailed. The gas is taken from the holder outlet; an anti-fluctuator being interposed between the holder outlet and the compressors.

ROUTE OF THE PIPE-LINE.

As the laying of the main alongside the railway, or the taking of a comparatively straight line along paths, by-roads, &c., to Immingham would have necessitated somewhat lengthy negotiations and probably insurmountable difficulties, it was decided to follow the road. This would increase the cost considerably, owing to its tortuous nature. But this was compensated for by the fact that three villages, as well as the houses abutting on the road, would be picked up; and the road being much frequented, any escapes or accidents to the pipe-line would be more quickly reported.

Steel tubes for the pipe-line were adopted by reason of the many advantages they offered. The pipes were supplied by the British

* See "JOURNAL," Vol. XCVIII., p. 936.

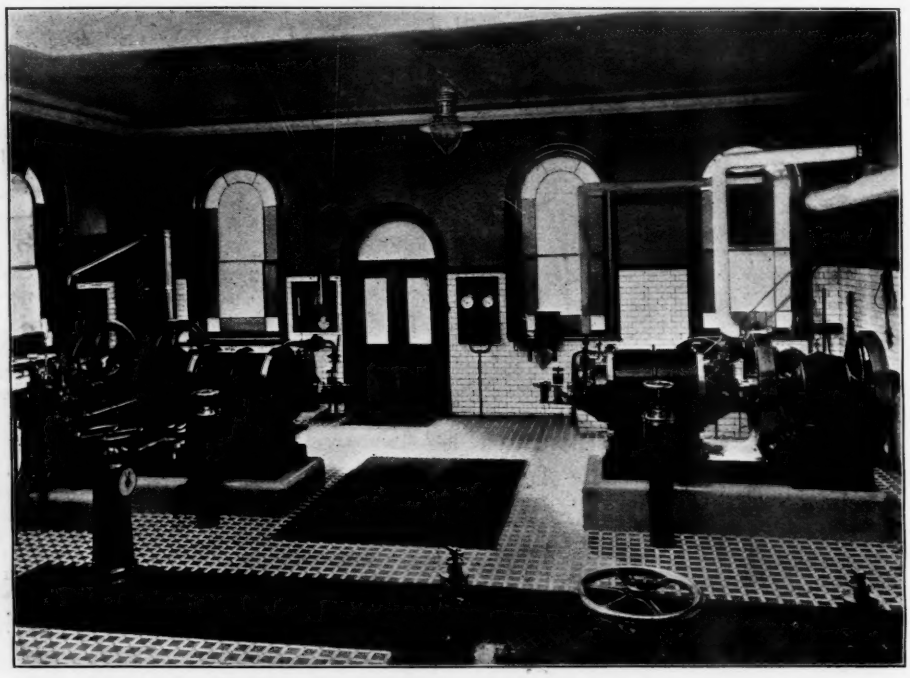
Mannesmann Tube Company, with "Rigid" joints, and covered with jute cloth. This joint has given every satisfaction. Its chief feature is what may be termed the extra depth of socket, which in 6-inch pipes is 8 inches. The spigot end is tightly driven into the socket to this extent, and the outer or ordinary socket caulked with lead wool; the inner socket enabling any stress or strain to which one pipe may be subjected to be evenly transmitted to the next, and the bearing of the pipes is taken off the jointing material. The joints have been found to be extremely flexible, and they may be drawn to a certain extent without causing any leakage.

The route of the main was surveyed, and a schedule of the quantities and sizes of pipes, the number of specials, and other necessary details, was ascertained. The material was ordered and delivered in such time that when the laying of the main was started it could proceed without unnecessary delay. Before the work commenced, the various local authorities were duly notified; the position chosen for the main being in the greensward on the side of the road. The digging and refilling of the trench was let to outside contractors, and was divided between two gangs operating independently at various points on the route; all the different portions being eventually linked-up. The jointing was done by skilled men attached to each gang; the average number of joints made daily by each jointer being 15. The main was graded with as much care as a low-pressure main, syphons put in at all the necessary points, and valves fixed every half mile. These valves proved very useful when testing; and they have enabled a section to be isolated for a short time for the purpose of making branch connections without interfering with the supply of gas on either side. A careful daily record of the number and length of pipes laid, their depth and exact situation, the positions of syphons, valves, &c., was kept, and the necessary details transferred to a 25-inch Ordnance map. The main was laid at a depth of 1 ft. 9 in. to 2 ft. 6 in., and the work of each gang tested daily.

One man in each gang was made responsible for cleaning, examining, and patching the covering on all tubes, clearing the outside of spigots and the inside of sockets, and wrapping and coating the joints after they had been tested. The flexible nature of the pipes enabled awkward bends in the pipe-line to be negotiated without the aid of specials; and in order to assist in preventing the pipes from springing-back, it was found advisable to leave in the packing-pieces.

Lead wool was used as the jointing material; and it gave every satisfaction. In making each joint, a ring of yarn was first inserted and well caulked, and the remainder of the joint made with lead wool; each strand being well caulked until the socket was filled to within a short distance of its face. The lead wool should not be stored in a cold place or allowed to get damp, as when required for use the fibres do not consolidate readily.

On referring to the map, it will be seen that district governors are installed at Healing and Immingham. As these places are fairly compact, and likely to become well populated, it was found that it would be cheaper and more satisfactory to govern-down by means of district governors, and supply the gas at ordinary low pressure, than it would be to continue the high-pressure



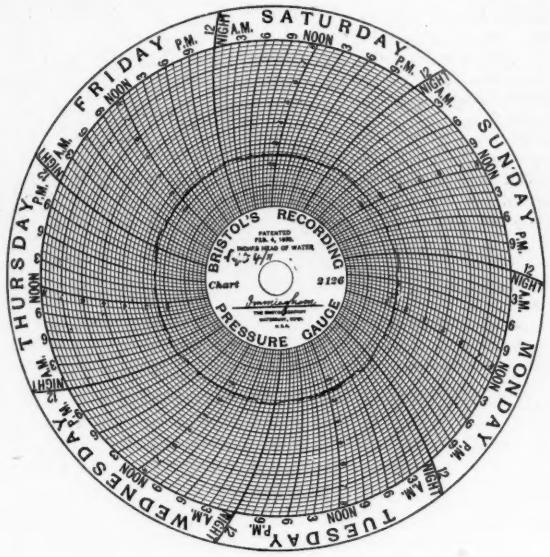
The Compressor-House at the Great Grimsby Gas-Works.

supply and provide each consumer with a service governor. The governors are placed in pits under the roadway; but the pits have given some trouble with regard to ventilating and keeping them dry. For this reason, any future district governors put down will certainly be housed above ground at some convenient point, if at all possible. The governors, both sets of which are in duplicate, are of the Reynolds type, as manufactured and supplied by the Bryan Donkin Company; their object being to reduce the inlet pressure of pounds per square inch to the ordinary district pressure. This must be maintained constant, however much the demand or the inlet pressure may vary.

As some members may not be familiar with a Reynolds governor, a brief description of it may be of interest.* The essential features are: Ordinary valves on the main high-pressure inlet and on the main low-pressure outlet; main governor fitted with double valves. A small connection is taken from the main inlet-pipe (before the main valve), and carried over to the main outlet. Interposed on this pipe, in the order named, are a small secondary governor (No. 1), a needle valve, a branch connection taken down to the bottom of what is called the auxiliary pressure bowl, and another secondary governor (No. 2). Small wheel valves are fitted on the inlet and outlet, so that the secondary governors can be shut off when necessary. The first secondary governor is adjusted so as to reduce the pressure to about 10 inches of water; the other secondary governor (No. 2) reducing this pressure to that required at the main outlet. The flow of gas passing through these governors is regulated by the needle valve. The auxiliary pressure bowl contains a diaphragm which is exposed to the pressure obtained between the secondary governors. Fixed to the diaphragm is a connecting-rod arranged to carry weights; the motion due to the varying pressure in the bowl being communicated to the main governor by means of this rod, a link, and a lever—thus causing it to open or shut as the case may be. By suitably changing the weights on the top of the secondary governor No. 2 and those carried by the connecting-rod on the auxiliary pressure bowl, the outlet pressure can be adjusted to any required amount. In times of small consumption, all the gas required will be passing through the secondary governors; the pressure obtaining between them will be acting on the auxiliary pressure bowl, and thus help to keep the main governor shut. Should the consumption increase, the outlet pressure will fall, causing the secondary governor No. 2 to open to its full extent; and, as the needle valve checks the volume of gas which can pass through the secondary governor No. 1, the pressure in the bowl will thus be relieved. The reduction in pressure causes the diaphragm in the bowl to fall, and as a result opens the main governor to the extent required, so that sufficient gas can pass to enable the outlet pressure to be maintained. A decrease in the consumption will cause the reverse action to take place. As the secondary governor No. 2 is adjusted to give the same outlet pressure as the main governor, any increase in the district pressure will tend to close the former, and thus cause the pressure between the secondary governors to bank-up. This increases the pressure on the auxiliary bowl, thereby causing the diaphragm to rise. The movement conveyed by the rod, link, and lever assists to close the main governor.

Bristol's pressure recorders are fixed on the inlet and outlet of each set of governors; and the charts being changed every week,

* For illustrations of the governor, see Mr. Searle's paper, already alluded to, in Vol. XCVIII. of the "JOURNAL."



the governors, &c., regularly receive any attention that they may require. The diagram shown is a typical example of a week's outlet pressure; and it will be seen that throughout the week the pressure has not varied more than 2-10ths of an inch.

Outside each governor pit a lamp column is erected, in the base of which is fixed a safety mercury seal connected to the outlet main; so that in the event of the governors not acting properly, and the outlet pressure banking-up to more than 11 inches, the seal would blow and the escaping gas pass away at the top of the column. The seal-pot is so arranged that the mercury will run back of its own accord, and, as soon as the pressure falls below 11 inches, form a seal again. On each of the two columns there has been fixed a bracket lamp containing two burners. These lamps are lighted and maintained by the Company free of charge, as a slight acknowledgment to the local authorities for granting permission to instal the governors in pits under the roadway.

Condensation.

All syphons are tried regularly. Those within half-a-mile of the compressors yield a small amount of syphonage at each visit, but beyond this point they are practically dry. The products of condensation are chiefly water and a light-coloured strong-smelling oil.

Effects of Compression.

Up to the present, it has not been convenient to make any accurate tests; but to all appearances the effects of compression are practically *nil*. In fact, some consumers in the out-district, especially those using incandescent burners, declare that the gas is better than that supplied in Grimsby. This is probably due to three causes: (1) Constant pressure; (2) removal of water vapour from the gas by compression; and (3) the fact that most of the appliances are of the latest pattern.

Method of Running the Plant.

The demand for gas at present does not necessitate the compressors being run continuously. The maximum extent to which the main is charged is 5 lbs. per square inch, and the minimum 2½ lbs. per square inch. A gauge is fixed in the engine-room; and as soon as the pressure falls to 2½ lbs., the pointer on the dial completes an electric circuit, and, ringing an alarm bell, attracts the attention of the engine man, who immediately starts the compressor, and runs it until the maximum pressure is reached. One compressor is now run continuously for a period of from four to six hours each evening

Services and Service Connections and Governors.

The use of steel pipes, of course, necessitated means other than the ordinary of connecting branches and services to the main, owing to the decreased thickness of the wall of the pipe. After considerable experience, the Woodall-Parkinson expansion nipple was found to be the cheapest and most satisfactory method of connecting services to steel mains. It has been used with advantage on pipes as small as 2 inches in diameter; while another point in its favour is that it can be used without any disturbance of the canvas covering the pipe.

When making connections for branch mains or services from the high-pressure main, the probable amount of gas the branch or service is likely to require should determine to a large extent the size of the hole to be drilled in the main.

Late one afternoon soon after the main had been brought into use, the gauge in the compressing-room was found to be falling rapidly, thus denoting that something was wrong. After some trouble, the fault was located; a cast-iron clamp connecting a 2-inch main having broken. The escape of gas was, of course, considerable; the hole drilled for the connection being ¾-inch in diameter. The probability is that if it had been the full size of the branch, all the gas contained in the trunk main would have escaped before the compressors could have been started again.

A large number of consumers are supplied direct from the high-pressure main. This necessitates a separate governor for each service, though in some cases (where houses adjoin) one governor serves four or six houses. The type of governor adopted is Reynolds high-pressure, as manufactured and supplied by the Bryan Donkin Company. All governors, before being sent out, are tested and adjusted to deliver gas at from 2 inches to 2½ inches pressure. These governors are generally placed in shallow pits just outside the consumers' premises; the only extra fitting required being a high-pressure cock fixed on the inlet, to enable the consumer to shut-off the supply in case anything goes wrong. A mercury seal is an essential part of each governor; this being necessary in case the outlet pressure, for some reason or other, is built-up to more than 6 inches. If it exceeded this point, the seal would blow, and thus allow the gas to escape safely. The vent of the seal should be piped to a suitable place outside; it should be out of reach, and have a bend placed on the end of it. Very little trouble has been experienced; and the governors give good results, however much the inlet pressures vary or the demand for gas fluctuates.

The use of high-pressure enabled the Company to secure a number of consumers who were at a considerable distance from the main, by being able to run service-pipes of small diameter. If the gas had been at ordinary low pressure, the increased size of pipe, and consequent increased cost, would, in most cases, have prevented this custom being secured.

Examples.

Service 86 yards long { 26 yds. ½-inch pipe / 60 yds. ¾- ,, ,, } Cost per yard, 9d.

650 yards of 1-inch service-pipe were run to secure five consumers at a cost of 1s. 3½d. per yard.

In planning the systems of mains for the low-pressure districts full and adequate allowance was made for future requirements. In most cases, a separate main is laid down each side of the road under the footpath, tees are inserted at intervals, and cross connections made. The initial cost of this arrangement is slightly higher than when only one main is laid; but the difference is amply compensated for in the long run, by the fact that there is a saving in the services, reduced maintenance charges, and, in all probability, less leakage, besides obtaining the very necessary regularity of pressure at all hours.

In order to assist people who contemplated having a supply of gas as soon as it was available in piping their houses, a leaflet giving general instructions and sizes of pipes required was distributed. Consumers requiring slot meters were provided with six fittings—two with incandescent burners—and a cooker (if required) free of charge. That the extra expenditure on slot installations is well justified is shown by the increased returns received.

Not only is the high-pressure main used for transmitting gas to the outlying districts, but from it are supplied a number of consumers, including a laundry, for lighting and heating irons, and a picture theatre. A branch main has recently been carried into a business centre of the town for the purpose of outside shop lighting, and seems likely to prove very remunerative.

The main is also used for boosting purposes. During the early part of the winter complaints were received of lack of pressure, at times of peak-load, from an outlying district through which the main passes. Diagrams taken showed that the complaints were justified; and, as the enlarging of the low-pressure main would have entailed considerable expense and loss of time, a connection was made from the high-pressure main to the low-pressure main through a special governor, which was adjusted to open when the pressure in the low-pressure main fell below 3 inches. This special governor is, of course, closed when the pressure is above this point. Pressure diagrams taken before and after the connection was made show that it is giving every satisfaction, and no further complaints have been received.

Conclusion.

The main object of this paper is to direct attention to the cheap and efficient manner in which outlying districts may be supplied with gas. There are, no doubt, a number of gas undertakings possessing powers of supply—which may not have been utilized—in districts that are both sparsely populated, and at a considerable distance from the works. The installing of a high-pressure system allows these areas to be developed with advantage, as the capital cost of the plant, being relatively small, will enable it, even if only a moderate demand is experienced, to pay its way.

In order to take advantage of modern methods for meeting competition, it is necessary that all undertakings of medium size should be able to give a supply of gas at high-pressure for lighting or other commercial purposes. Its use for reinforcing the supply in existing low-pressure systems, by means of branch connections and special governors, is of considerable importance, increasing as it does the carrying capacity of existing mains and enabling them to be retained; whereas, under ordinary conditions, the mains would have to be enlarged—thus necessitating the expenditure of a considerable sum from which no increased return would be received.

[For discussion, see next page.]

At the usual Monthly Meeting of the Association, held at the Leeds Institute last Saturday—the VICE-PRESIDENT (Mr. C. T. B. Roper) occupying the chair, in the enforced absence of the President (Mr. C. D. Cawthra)—the foregoing paper was read; and it gave rise to the following discussion.

Mr. W. CRANFIELD said his first duty was to congratulate the Association and the reader of the paper—the former on having secured so valuable a recruit for its public work, and Mr. Kennington on having so successfully handled a subject new to their meetings. His fulness and clearness of description had been admirable; and they thanked him for an exceptionally interesting contribution. He would like to know if their compressors were single or of the two-stage type, as evidently, from the description, they worked independently and not in series. How much gas was supplied through the high-pressure system? He could have wished that an enlarged drawing of the Johnson-Reynolds district governors for high pressure had been exhibited. Few, if any, present had actual experience of it; and no description, however carefully prepared, could make it satisfactorily clear to an audience without illustrations. He hoped these would eventually appear in the paper. He had to confess to feeling very disappointed when he heard that the volumes that the Grimsby high-pressure main could deliver at various pressures had merely been calculated from a formula. Such calculated results were being too plentifully quoted. What was wanted were figures of tests actually carried out. In the present case, a direct run of 10½ miles of new 6-inch main had been an exceptional opportunity for finding what volumes would have been delivered at the far end with approximately a free discharge at atmospheric pressure, starting with various initial high pressures. Even now it was to be hoped that, as opportunity served, such observations would be made and published for the general good of the industry. Even in estimating the discharges they expected to secure, why did they allow for a final pressure of 1 lb. per square inch, and not a free discharge, or, at all events, the working 2-inch pressure?

Mr. R. HALKETT congratulated the writer on his well thought-out paper. It was advisable that the members should be familiar with the possibilities of high-pressure gas distribution as an easy means of reaching outlying districts, and of stimulating the supply in existing areas. It had been a great pleasure to him to have had the privilege of inspecting the installation at Grimsby; and he had been much impressed with its simplicity and its results. That they had had at Immingham no greater variation of pressure than 2-10ths in 24 hours was excellent; and if a constant quality of gas was also supplied, contented consumers were assured. The Mannesmann tubes were now pretty widely recognized as being the right kind for high-pressure gas-mains. While agreeing with Mr. Kennington's description of the ease with which these pipes could spring a curve in open country roads, he would point out that in the crowded streets of a busy town, with shallow trenches and many other pipes and cables near, it was often impossible to get sufficient leverage to do the bending safely; and some of the bending had to be done prior to laying the main. At Leeds, they had attached services to the street mains by preference by means of Farrar's service clamp with double straps. It was a type that needed no disturbance of the wrapping. The main was bored, and a lead washer smeared with red and white lead enabled them to make a good sound connection. Its great advantage was that it was easy to remove in case a larger service was needed, whereas with the Parkinson nipple this could not be done. Either the existing connection would have to be plugged and a fresh tapping carried out, or it would have to be cut off short, and driven back into the main. He should like to ask what valves were used on the mains—whether the single rack-and-pinion or the Bryan-Donkin double type. He greatly doubted the advisability of using such small pipes as ⅜ inch and ½ inch services. Even though the syphons showed that after the first half mile the gas was dry, corrosion from the land was possible, and the margin of safety was hardly adequate if they looked well ahead. Such pipes would be weak at the threads for high-pressure gas, and might easily fracture at the sockets. Was the oil found in the early syphons benzols deposited from the gas, or was it mainly oil thrown forward by the compressors? The issue of leaflets giving information about the sizes of services, &c., was a good idea; but he strongly advocated going further, and getting into actual touch with consumers and builders, which was the best road to success in these matters.

Mr. F. SCHOLEFIELD asked if they had any means of finding out how much gas was sent along the high-pressure main, and what the amount of leakage was. Had they any special meters for the shops supplied with high-pressure gas?

Mr. E. J. SUTCLIFFE inquired as to the cost per yard of laying the main.

Mr. M'NAB asked what type of governors and meters were used for houses supplied direct with high-pressure gas.

Mr. J. H. HILL endorsed what had been said as to the importance and interest of the paper, and said that no doubt more requests for information might very easily be made than could be satisfied. He should like to know what the levels of the new district were, how many syphons were installed, and what leakage was experienced. Enterprise and careful calculation were clearly evidenced by the successful carrying through of a scheme of such magnitude. What measure of success had they found in securing customers? Doubtless a good many slot consumers could be attracted if free piping and six fittings were supplied. But how about landlords? Were they undertaking the piping of new houses; were they thus helping to bear the capital expense? They had been told of the granting of powers for additional charges to the outlying districts. Were these charges actually in force, and, if so, what were the respective charges in Grimsby and outside?

Mr. KENNINGTON thanked the meeting for their kind reception of his initial effort. Replying to the questions put to him, he said the consumption supplied by the high-pressure main amounted to 8 million cubic feet in the year. The compressors were of the single-stage compression type, and gave no undue decline of efficiency owing to "slip" even against 5 lbs. pressure. Their method of working the compressors was to run till a pressure of 5 lbs. was shown, and then they were stopped. When the pointer on the pressure-dial got down to 2½ lbs. indication, it completed an electric circuit, which rang an alarm-bell and thus summoned the attendant, who then restarted the compressors, and kept them going till 5 lbs. pressure was again indicated. He would pass round gauge-charts showing the record of these initial pressures during a week. He accepted the hint as to the advisability of actually measuring discharges under a high-pressure delivery, and hoped to be able to furnish such data at some future time. He would venture to remind Mr. Halkett that the 2-10ths maximum variation was in a week, and not in 24 hours. They used the Parkinson expansion-nipple, but not exclusively. The great advantages that appealed to them were its cheapness and its soundness. The difficulty of replacing the nipples with others of a larger size must be admitted; but they had found much trouble with clamps. They were constantly breaking and causing serious leakages. These fractures were caused either by unequal tightening of the nuts or by inherent weakness or brittleness in the metal. Their valves were of the wedge type. Their high-pressure services were mostly led through the virgin soil of fields; and they wrapped hemp fibres round the threads to make the screwed joints gas-tight. Their district was exceptionally flat. He had not with him any record of the number of syphons. The total cost had been £8500; and the profit on the gas for the first year was sufficient to pay 5 per cent. on the outlay. The cost of laying the main was 5s. 11d. per yard; and the excavating had been done in the sward for 8½d. per yard. The gas undertaking piped the houses at first; but in new houses this was being done by the landlords. In Grimsby the charge for gas was 2s. 2d. and at Immingham 2s. 8d. per 1000 cubic feet; while to slot consumers 25 and 20 cubic feet respectively were supplied for 1d., subject to a rebate of 10 per cent. To try to ascertain the leakage, attempts were made by meter makers to devise a satisfactory meter for measuring the high-pressure gas entering the main; but they finally gave up the attempt. The high-pressure gas sold as such was measured in specially strengthened meters supplied by two well-known makers; and it was governed to 2 lb. pressure at the inlet of the meters. To get a correct record of gas supplied, they added 0·2439 per cent. to the meter readings for each 1 inch of water pressure (roughly 1 per cent. for 4 inches). The oil found in the syphons was mainly lubricating oil from the compressors.

A PAPER ON "COAL TESTING."

Mr. C. Ostler (Halifax) followed with a paper on "Coal Testing." This, with a report of the discussion upon it, is unavoidably held over till next week.

On the motion of Mr. C. TOWNSEND, seconded by Mr. J. DEMAIN, the writers were warmly thanked for their papers, and the business closed.

The Secretary and Treasurer of the Junior Institution of Engineers (Mr. A. Clifford Swales) has forwarded to us a booklet which has just been issued dealing with the origin and aims of the Institution, which was formed at the works of the late well-known firm of Messrs. Maudsley, Sons, and Field, in 1884. Among the Presidents, Vice-Presidents, and officers, the names of some famous men are noticed in the list given. A copy of the booklet can be obtained free at the offices of the Institution, 39, Victoria Street, Westminster, S.W.

We have received from Mr. Effingham Wilson, of 54, Threadneedle Street, E.C., one of the latest of his useful series of "Legal Handy Books," bearing the title of "A Guide to the National Insurance Act." As everybody knows, the Act in question is the result of a vast amount of discussion, and as it stands its provisions are voluminous and extremely complex. One section must be read in the light of another, or as explained by a schedule; and constant references and cross-references are as needful as they are irksome. As so many persons are affected by the Act, and as its scope and bearing should be known to all, any assistance which can be afforded by a competent person in elucidating it should be specially welcome. This help is given by the author of the little book under notice—Mr. H. Wippell Gadd, of the Middle Temple and of the Western Circuit—who has endeavoured to provide a plain exposition of the Act, and answer as clearly as possible the varied questions which will most probably be put as to its purport. The chapter headings and a comprehensive index should render comparatively easy the task of finding answers to questions on particular points. The price of the book is 1s. net.

ELECTROLYSIS IN UNDERGROUND PIPES.

INSULATION AS A MINIMIZING FACTOR.

By E. B. Rosa and Burton M'Collum.

(*Concluded from p.* 438.)

Types of Insulating Joints.

It is well to call attention at this point to some of the various types of insulating joints that are now in use. These may be divided into four classes: (1) Clamped joints using a rubber gasket or other insulating material to make a tight joint and provide the insulating section; (2) wooden joints, including wood stave-pipe sections; (3) cement joints, of which there are various types; and (4) leadite joints. The first of these, exemplified by the well-known Dresser and Hammon couplings, is extensively used for the purpose of securing gas-tight joints; and some types of them also make insulating joints. When properly designed and installed, a very high-resistance joint is given; and it has been very effectively used in a number of instances for the purpose of reducing the flow of current in the pipes. The construction of one form of Dresser coupling, known as the divided centre-ring insulating coupling, is shown in the following diagram (fig. 6).

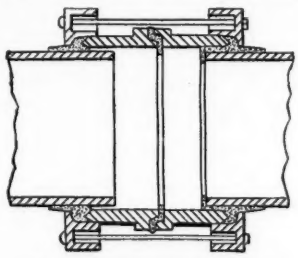


Fig. 6.—The Dresser Coupling.

Both these types make very satisfactory insulating joints for most purposes, though they may, under certain circumstances, be liable to injury because of the relatively short leakage path, the importance of which has already been discussed. Under most circumstances, where the local potential gradients are not too high, this should not cause any trouble. Some has been reported, however, where these couplings have been used on artificial-gas mains, owing to the deleterious effect of the gas on the rubber gaskets. They do not appear to be affected by natural gas; and in these mains they seem to show a satisfactory life.

Of the wooden joints, numerous modifications are in use. One type used by the Pennsylvania Water Company is shown in the next diagram (fig. 7), which is self-explanatory. This joint has a high electrical resistance, and is particularly adapted for use in places where only one joint (or at most a few) is installed, and the drop of potential across the joint is likely to be high. The

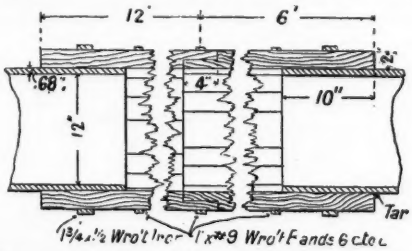


Fig. 7.—Wood-Stave Joint used by the Pennsylvania Water Company.

great length of the joint is very effective in causing any leakage current around the joint to distribute itself over a considerable length of adjoining pipe, as pointed out above, and thus prevent concentration of electrolysis at the edge of the joint.

Another type of wood-stave joint is shown in the following diagram (fig. 8). The spiral steel band used in this construction would have the effect of materially shortening the leakage path;

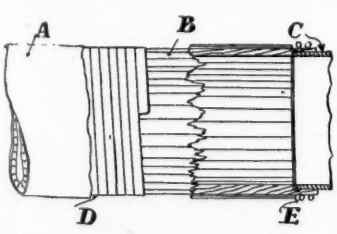


Fig. 8.—Wyckoff Stave Pipe, showing Connection to Iron Pipe.

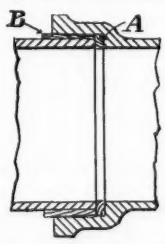


Fig. 9.—Insulating Joint used by the Boston Water Board.

and while it would have ample resistance to serve as an insulating joint under most circumstances, it could not safely withstand as high a drop of potential across the joint as that described above.

The Metropolitan Water Board of Boston use the type of wooden joint shown in fig. 9. It is simple in construction, consisting of a ½-inch wooden liner (shown at A) made of overlapping sections of wood; the ring thus formed being wound with canvas impregnated with paraffin. The purpose of this is to prevent possible metallic contact between the ends of the pipes. The wooden staves are of clear white pine, planed to fit the curvature of the pipe, and are driven in by a special driver to prevent splintering. Any leaks that may develop are stopped with white pine wedges (shown at B). These joints have been found very satisfactory up to about 75 lbs. pressure. Higher pressures sometimes cause moderate leakage through the pores of the wood; and this has been overcome by dipping the inner ends of the staves in red lead. In some cases the staves are reinforced by an iron band clamped round the spigot end of the pipe. Usually a slight change is made in the castings where this joint is to be inserted; the spigot end being cast without bead, and the inside of the bell smooth without groove. The cost of these joints has been given as ranging from $5 to $12 (say, 20s. 10d. to 50s.) when installed in new lines; but when installed in old mains it would be much higher. The resistance of this joint is ample under all circumstances that may arise; but the relatively short leakage path would often make it necessary to use the joint with greater frequency than with joints having a long path.

Cement joints have been given a variety of forms, and one which has been used successfully for years by the Cambridge (Mass.) Gas Company, is shown in the following diagram (fig. 10).

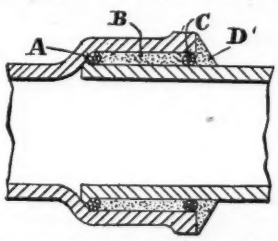


Fig. 10.—Cement Joint used by the Cambridge (Mass.) Gas Company.

In making this joint, the inner ring of hemp A is chosen exactly the right size to fill the annular space between the bell and spigot; and this is rolled in when the pipes are set together, and driven hard with the caulking-tool. As usually done by the Cambridge Company, no special attempt is made to keep the metal of the two adjacent lengths of pipe apart. But, notwithstanding this fact, the resistance of the joints has, on the whole, been high enough to prevent the accumulation of any considerable quantities of stray currents. As a consequence, this system has never been troubled by electrolysis, though the pipes of the Cambridge Water Company have suffered severely. After thoroughly tamping the ring of hemp into position, the cement B is carefully worked into the joint with a trowel and caulking-tool until the space between the bell and spigot is filled flush with the face of the bell. Another turn of hemp C, similar to the first, is then laid against the cement, and driven in with the tool just under the edge of the bell. The cement is in this way rendered very dense; and on this feature depends in large measure the success of the joint. A collar of cement D is finally laid over the outer ring of hemp, to protect it from rot.

If success is to be achieved with this joint, great care must be exercised in making it. Perfect cleanliness of the inside of the bell and the outside of the spigot is necessary; and all loose scale and sand should be removed before the cement is put in place. Only the best quality of cement should be used, and it should be thoroughly mixed, and tamped into the joint with the greatest care. Careful bedding of the pipes is equally important, as the cement joint is much less yielding than lead; and if any considerable lateral movement of the pipes takes place, it is liable to break the pipe—the strength of a well-made joint being, as a rule, greater than that of the pipe itself. In some instances, instead of making every joint of cement, every third or fourth joint only is made of this material; the others being lead. Except in extreme cases, this seems likely to prove practically as effective in minimizing electrolysis; and it has the great advantage that the lead joints impart a flexibility to the system that will greatly reduce troubles due to lateral movement of the pipes.

The use of leadite joints has been confined chiefly to water-mains; and for such service many prefer it to any other type of joint. This material is melted and run into the joint after the manner of a poured lead joint. It is cheaper than lead, and many claim that it makes a better joint mechanically. It often happens that when the joints are first made, a large proportion of them will show considerable leakage; but in the presence of water they seem to have a tendency to seal themselves up, and the leaks will usually cease entirely within a day or two. It is very important to see that a dense mass completely fills the joint; and it is lack of care in this respect that is probably responsible for most of the trouble with leaky joints. The runner used in pouring the joint should be so designed that there will be a head of 8 to 10 inches above the joint. If the material is at proper temperature, this head is usually sufficient to ensure a dense homogeneous mass of leadite in the joint. As already noted, the resistance of leadite is very high when first run; but after lying in the ground for some

time, its resistance decreases greatly. As to whether this will continue to such an extent as to render it worthless as a resistance joint cannot be stated at present. But the material appears to possess many interesting possibilities, and should be carefully studied.

Application of Remedial Measures.

In attempting to reduce the damage from electrolysis, it must be borne in mind that the best results are not to be derived from the application of any one method of mitigation alone. Whatever the system that may be applied to the pipes, it is of prime importance to give proper attention to the condition of the tracks and the negative return system generally, since the difficulties encountered in connection with any system of protection will be reduced in proportion as the drop of potential in the rail return is lowered. Since, however, as the conductivity of the negative return is increased, and the drop of potential in the negative return is brought to a relatively low value, further reductions can be accomplished only at relatively great expense; and after a certain point is reached, it will be more economical to apply further protective measures to the pipes themselves. It is of first importance, therefore, to have sincere co-operation between the pipe companies and the railway companies, if the most effective measures are to be applied at the minimum cost to all parties.

Conclusions.

Conclusions in regard to matters pertaining to the mitigation of electrolysis must be drawn with great caution; and much additional work must be done before very definite judgments can be formed in regard to many of the problems which have been referred to. But a careful review of the situation, as regards the methods of protecting pipes by insulation, seems to warrant the following conclusions:

1.—The insulating paints thus far tested deteriorate much more rapidly when subjected to electric stress than when the electric stress is absent; and such paints should not be depended upon to protect pipes against electrolysis unless they have been thoroughly tested under conditions which subject them to electric stress.

2.—Insulating paints, because of their tendency to fail locally, and thus concentrate the discharge of current, may do actual harm, and therefore should not be used in regions where pipes may be expected to become strongly positive to the earth.

3.—In all places where the pipes are likely to remain negative or neutral to earth, no harm can result from local failure in reducing current flow in pipes and in preventing soil corrosion.

4.—Where insulating joints are properly used, the pipes do not, as a rule, have a very strong tendency to discharge current into the earth; and in such cases paints may be safely used to prevent soil corrosion.

5.—The rapid deterioration of paints under electric stress is due to the fact that a trace of moisture finds its way through the coating; thus permitting a feeble current to flow, resulting, at first, in very slight electrolysis. The formation of gases with other products of the electrolysis then causes rupture of the coating and the formation of blisters.

6.—Laying of pipes in conduit or embedding them in cement is not to be recommended as a protection against electrolysis, it being a useless expense.

7.—Insulating joints, rightly used, can be made very effective in minimizing electrolysis.

8.—Those who have had most experience with insulating joints up to the present time regard them as economical, and entirely practical from a mechanical standpoint.

9.—Insulating joints should be carefully made to ensure permanent insulation.

10.—Insulating joints should not be confined to positive areas, but should be installed in all places where there is any considerable potential gradient parallel to the pipes, and should be installed with sufficient frequency to prevent any considerable current from flowing in the pipes, and so that a dangerous potential difference cannot occur across the joint.

11.—The effective resistance of a joint depends not alone on the resistance of the joint proper, but also on the resistance of the leakage path in parallel with the joint. For this reason, the effective resistance of a joint increases very slowly with increase of length; so that short joints are practically as effective in reducing flow in pipes as very long ones.

12.—Long joints give a much more uniform distribution of leakage current, and hence less rapid deterioration of the adjoining pipes, than do short joints; so that in special cases, where it is necessary to have a high drop of potential across the joints, a long joint is to be preferred.

13.—If pipe-lines containing insulating joints are connected to mains not so insulated, the insulating joint immediately adjoining the uninsulated line will, as a rule, be subjected to higher differences of potential than elsewhere. This is particularly true if negative feeders are connected to the uninsulated main. For this reason, the use of insulating joints and negative feeders on the same pipe system is not to be recommended.

14.—Where insulated and uninsulated systems occupy the same territory, and where it is necessary to have metallic contact between them, as inside buildings, an insulating joint, placed between the point of contact of the two systems and the point where the insulated system enters the earth, will be of great value in preventing current from flowing from the uninsulated into the insulated system.

Further Investigation Needed.

In presenting the foregoing preliminary report on certain phases of our work to date, we recognize that there still remains a vast field in which investigational work must be continued for an indefinite period before we can hope to advance our knowledge of this complex and troublesome problem to the point which the great economic importance of the subject demands. In continuing our work relating to this and other phases of the electrolysis problem, it is important that we keep as closely as possible in touch with the gas, water, and electric railway interests, in order that our work may be carried forward along most effective and practical lines. Communications from engineers dealing with any phase of the electrolysis problem will, therefore, be welcomed.

DIRECT RECOVERY OF AMMONIA FROM COAL GAS.

The descriptions given recently by Herr A. Fürth (Chemist at the Leipzig Gas-Works) of the Otto and Koppers processes for the direct recovery of ammonia [“Journal,” Vol. CXVI., p. 607] have suggested to Herr Pfudel, the Manager of the Charlottenburg gas undertaking, that the third direct recovery process in use in Germany—viz., that of the Mont-Cenis Mine at Sodingen—should also be described. He has given the following particulars of the process in the “Journal für Gasbeleuchtung.”

The gas is cooled in the ordinary way to a temperature of about 86° to 95° Fahr., and passed through a Pelouze tar extractor. It is then delivered through either a tube, with a bell-shaped mouth, or a perforated worm, into a saturated solution of sulphate of ammonia, mixed with 5 to 15 per cent. of free sulphuric acid, contained in a closed saturator. The gas as it issues from the saturator passes through a spray separator. The weak liquor obtained in the condensers through which the gas had previously passed is put into a column in which the ammonia is driven off, and, after being freed as far as possible from water vapour, is passed into the stream of gas immediately before the saturator. The whole of the ammonia thus enters the saturator with the gas. The heat of neutralization of the sulphuric acid with ammonia in the saturator produces sufficient heat to drive off the water contained in the sulphuric acid used, and to keep the moisture which arrives with the gas in a state of vapour. Thus solid sulphate is formed in the saturator. The heat of saturation suffices, in fact, to raise the temperature of the gas passing through the saturator. If the gas leaves the tar extractor at 86° Fahr., it is raised by some 20° Fahr. by the ammonia from the column, and on leaving the saturator has a temperature of about 122° Fahr. At the coke-ovens this gas is used forthwith for firing the ovens or boilers. If the gas had to be freed from benzol or purified from sulphuretted hydrogen to render it suitable for distribution, it would have to be cooled to about 68° Fahr., in order to ensure proper removal of benzol by the heavy tar oils used for washing, and to prevent the purifying material becoming obstructed by moisture. The salt deposited in the saturator collects at the bottom, and is raised by an air-jet on to a draining platform, from which the excess of lye runs back into the saturator. The salt is subsequently dried in a centrifugal, and the lye removed therein is returned to the saturator. Steam for warming the gas before the saturator is dispensed with.

The Mont-Cenis Mine has had an installation at work for three years on its coke-ovens for the extraction of ammonia and benzol from 5,300,000 cubic feet of gas per 24 hours; but for the sake of economizing labour, the production of sulphate is actually carried out only in the day shift. At the close of this shift, the distillation column for the weak liquor is shut off, and the lye in the saturator is brought to a strength of 38° Baumé. During the night the sulphuric acid is saturated by the gas passing through, and its specific gravity thereby becomes reduced to about 32° Baumé. The temperatures and pressure in the apparatus are observed once every two hours both at night and day. When the day shift comes on, the distillation column is again brought into action, and the manufacture of the stronger salt is started again. The gas exhauster requires a maximum of 40 H.P., while 700 cubic feet of air at three atmospheres pressure are required for raising the 4½ tons of salt produced in the saturator per diem. The gas after passing the saturator contains from 0·6 to 1 grain of ammonia per 1000 cubic feet. The sulphate obtained is beautifully white, and contains 25·12 per cent. of ammonia and 0·29 to 0·39 per cent. of free acid.

The Mont-Cenis process appears to the author well adapted for use on gas-works; but a second saturator ought to be kept in reserve, though the single saturator at the Mont-Cenis Mine has worked uninterruptedly for three years.

Ilkeston has been rather unfortunate this year. After the gasholder disaster there were minor troubles due to electricity; and a few days ago the town sustained a great loss by the sudden death of the Mayor, Councillor F. Chambers, J.P. Deceased was essentially a self-made man, having risen from a working lad at the pitbank to the highest position the town of Ilkeston could give him; and his death, in his 63rd year, brought to a close a very active and self-sacrificing life. His funeral was attended by all sections of the community.

REGISTER OF PATENTS.

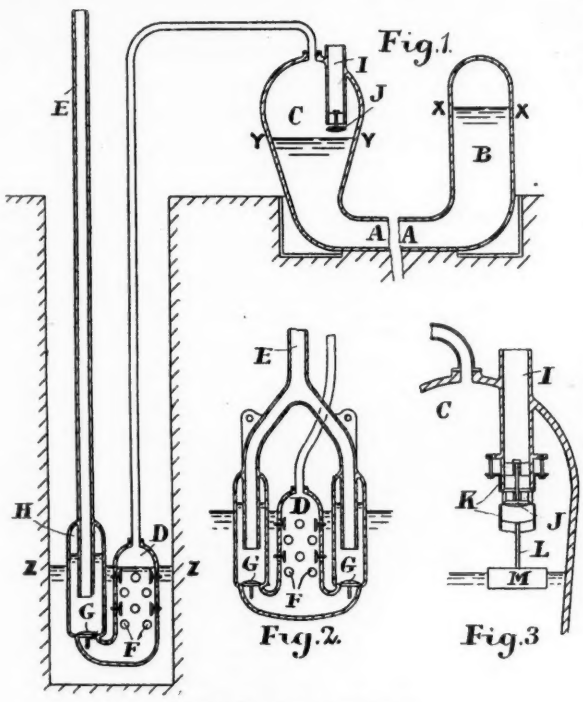
Compressing Gas and Utilizing its Expansive Force.

HUMPHREY, H. A., of Victoria Street, Westminster.

No. 1241; Jan. 17, 1911.

The inventor has already patented several types of apparatus in which a column of liquid flows freely into an air-vessel "under action of the energy of expansion of an ignited combustible mixture" (as Nos. 18,594, 18,595, 19,341, 22,646, and 25,638 of 1907) or "under action of a head of liquid" (as No. 12,565 of 1908), and a column of liquid flows from the air-vessel under action of the expansion of compressed elastic fluid therein.

In these examples, he says, either no air is discharged under pressure from the air-vessels to do work (the usual case where the apparatus is a pump) or no air discharged under pressure to do work is allowed to return directly to the air-vessel (the usual case where the apparatus is an air-compressor). In the present invention, he allows air to be discharged under pressure, and, after doing work, to return directly to the air-vessel. As the column of liquid moves towards the air-vessel, air is discharged to do work—as, for instance, to raise liquid; and as the column moves from the air-vessel, the same air returns to it. Thus there is a liquid column which reciprocates generally between a combustion chamber and an air-vessel combined with a volume of air which reciprocates between the air-vessel and the place where the air does work.



Humphrey's Gas-Power Pump.

Fig. 1 is a vertical section of one simple form of apparatus in which is represented diagrammatically a combustion chamber or chambers such as are described in any of the earlier specifications, and which may operate on the two-stroke or four-stroke cycle. A is a play-pipe, in which a column of liquid reciprocates and which connects the combustion chamber B with an air-vessel C, so that when the level of the liquid in the chamber B falls the level of the liquid in the air-vessel C rises, and *vice-versâ*. A pipe (preferably flexible) connects the air-vessel C with a second vessel D, which, in the example shown, is placed in a well from which liquid is to be raised through the pipe E. In the vessel D are a number of liquid inlet valves F, opening inwards, and one or more non-return valves G, opening outwards for the discharge of liquid into the air-vessel H and delivery pipe E. The vessel C may in some cases be fitted with a pipe I controlled by a valve J, adapted to be shut by the action upon it of the liquid rising in the vessel.

The action of the apparatus is as follows: Assuming the liquid levels in the chamber B, air-vessels C, and in the well to be X, Y, Z respectively, and that the apparatus works on a two-stroke cycle and there exists a compressed charge of gas and air in the top of the chamber B, then the ignition of this charge starts the cycle. Liquid is driven downwards in the chamber B, and the column of liquid in the play-pipe A moves outwardly from the combustion chamber—causing the liquid in the air-vessel C to rise. At first, air in the top of the vessel is displaced past the valve J and through the pipe I into the atmosphere. But when the liquid in C reaches the valve it shuts it, and the further movement of the liquid compresses the air remaining in the top of the air-vessel, thus forcing air into the top of the vessel D, which contains liquid and the valves F of which are shut. As soon as the pressure of the air in D is sufficient to cause the valve G to open against the pressure to which the liquid is to be raised or forced, liquid is driven downward in the vessel D and past the valve into the air-vessel H, to be thence delivered into the pipe E. The delivery of liquid continues so long as compressed air flows from the air-vessel C into the vessel D. But meanwhile the work of compression and delivery of air from C absorbs the energy imparted to the liquid which reciprocates in the play-pipe A and brings this column of liquid to rest. The compressed air now contained in the vessel D, and any air remaining in the air-vessel C, now expands and causes the column of liquid in the pipe A to make a return stroke towards the chamber B, in which a fresh combustible charge has been introduced; and this charge is now compressed by the returning column of liquid. The valve G prevents the liquid delivered from returning into the vessel D; and as the pressure of the expanding air in the vessel diminishes, there arrives a time when the liquid supply valves F open under the pressure of the surrounding water in the well, so that water again fills the vessel D as the air leaves it to travel back into the air-vessel C. The last part of the downward movement of the liquid permits the opening of the valve J and the intake of fresh air from the atmosphere until the conditions are again those from which the cycle started. The latter is then repeated.

Instead of the rising liquid in C shutting the valve J directly, it is sometimes advantageous (especially when the valve is a large and heavy one) to adopt the construction shown in fig. 3 (drawn to an enlarged scale). In this case, there is a guided ring K, sliding vertically and connected by radial arms with a stem L attached to a plate or float M. The ring is pierced by holes or ports, so that when in the position shown elastic fluid can escape through them and past the valve into the pipe I. As soon, however, as the rising liquid moves the float upwards, the ports are no longer in a position which admits the escape of elastic fluid. Consequently, the pressure rises in the vessel C, and, acting upon the under side of the valve J, causes the valve to shut under the increasing pressure of the elastic fluid.

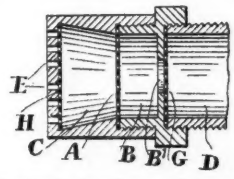
In the construction shown in fig. 1, while the liquid is being expelled past the valve G there will be a resultant force due to the acceleration of the liquid tending to move the portion of the apparatus which is placed in the well. As it is sometimes convenient to suspend the apparatus, the construction shown in fig. 2 may be adopted in which there are a plurality of liquid discharge valves and air-vessels arranged symmetrically with regard to the chamber D, so that the forces then tend to balance one another.

Gas-Injector.

GRAFTON, W., of Glasgow.

No. 1281; Jan. 18, 1911.

This invention has for its object to provide "for delivering a volume of gas at such velocity as will induce into a tube or burner proper a requisite volume of air, without noise, and sustain such a gaseous mixture when used for heating purposes (as, for instance, in a gas-fire) that the mixture will be delivered for combustion in a more economical and advantageous manner than heretofore." The invention provides for adjusting the gas passage-ways in proportion to the orifices at the point of ignition. Accordingly, the bore or gas-way in the inlet of the injector is formed of a single opening of such dimensions that its area is the same as, or less than, the aggregate area of the holes in the outlet chamber from which the gas escapes—the holes in the outlet chamber being numerous and scattered. As showing the importance of this, the patentee remarks that "the object of the invention would not be served by the provision of a single outlet orifice and an inlet constituted by a plurality of angularly arranged openings, even if of less aggregate area than the area of the outlet orifice."



Grafton's Gas-Burner Injector.

In the example given of a gas-injector constructed in accordance with the invention, the nozzle is made in two or more parts in such manner that, by interposing wire gauze, woolly material, or the like at A, chambers B and C are provided—the former adapted to receive gas through a constricted opening B^1 from a supply pipe D. The flow of gas is impeded by the gauze at A; and the gas is brought to uniform speed and then allowed to percolate into the chamber C, the function of which is similar to the chamber B—the gas being discharged from the chamber C through perforations E into the usual open or bunsen tube. Layers or screens of wire gauze are also fitted at G and H.

With an injector or nozzle constructed as described, "a broad-based stream of gas of peculiar formation is issued silently therefrom, while air is induced to produce the required combustible mixture, which, when ignited, emits the desired character of flame or flames which will give the desired efficiency without noise."

Cut-Off Valve for Gas-Pipes.

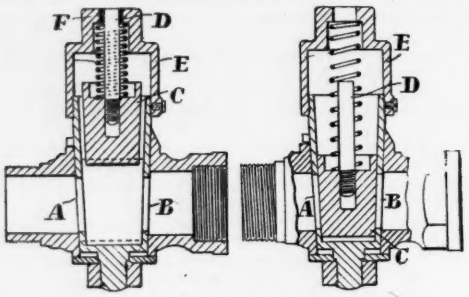
TINLINE, W. J., of Hastings, New Zealand.

No. 1606; Jan. 21, 1911.

This fire-emergency valve for gas-pipes is of the type in which a main valve or stop-cock contains within its body a secondary or emergency plug adapted to be closed by spring-operated means. The end of the spindle of the valve is left plain, and is secured in the inoperative position by a thin annulus of fusible metal surrounding the end of the spindle, so that when it becomes softened by any dangerous rise of temperature, the emergency valve commences at once to operate.

The illustration shows the tap with the passage through it open and closed.

The plug in the tap casing has portways A and B for the passage of gas, and an emergency plug C formed to closely fit the lower part of the plug. It is normally retained in the upper end of the plug by a pin D, which, at its upper end, passes into a hole in the cap E, and is



Tinline's Cut-Off Valve for Gas-Pipes.

secured by fusible metal F. A spiral compression spring surrounds the pin; its upper end being in a recess in the cap, and its lower end in a recess in the plug.

In the second view, the metal F has become fused, and the emergency plug C has been pushed by the spring into the bottom of the hollow plug, which it closely fits, and thus closes the portways A.

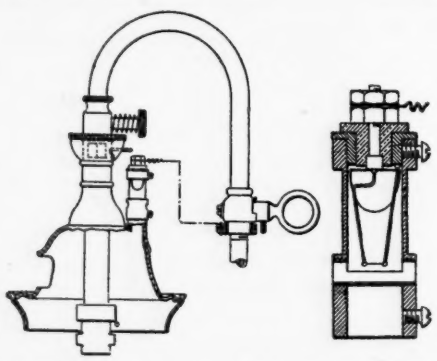
Gas-Burner Ignition.

LYON, H., of Gloucester, New Jersey, U.S.A.

No. 1827; Jan. 24, 1911. Date claimed under International Convention, Feb. 2, 1910.

This invention relates to means for igniting a jet of combustible gas—particularly that class of device wherein a charge of gas is received into a chamber placed in proximity to the burner-nozzle—the chamber having mounted in it a platinum wire or filament adapted to be heated by an electric current—ignition of the gas taking place by catalytic action.

Several suggestions to this end have been made by various patentees (some of which are specially alluded to); but all, the present patentee says, have been defective in practice, since either the gas failed to ignite or the platinum wire or filament was overheated and soon destroyed. Even if the arrangements were such as to be effective under normal pressure and quality of gas, it was found that on a variation of either pressure or quality, either failure of the gas to ignite or destruction of the filament was the result.



Lyon's Self-Ignition Apparatus for Inverted Gas-Burners.

After careful study and experimentation, he claims to have been able to analyze the problem presented—to determine the necessary conditions governing the location of the ignition wire; and he has invented "a successful method and apparatus" for the ignition of inverted gas-burners. He mounts an ignition wire or filament at a distance from the burner-head; liberates the gas into the body of air with which the lamp is normally filled; directs it into the vicinity of the filament; and simultaneously dilutes the mixture thus formed with air and energizes the filament. When the gas is first turned on, the filament (preferably a wire of platinum or platinum alloy) is surrounded by air. This air is then replaced by a mixture of gas and air, which becomes progressively richer as the gas continues to fill the lamp. The time quickly arrives when the richness is sufficient to cause the gas to ignite, whereupon the usual explosion takes place. The gas in the lamp is consumed, and the jet burns at the burner-head—thus automatically cutting off all gas from the ignition filament. The explosion, of course, takes place at the very moment that an inflammable or critical mixture reaches the filament; and a rich mixture can therefore never reach the filament. By reason of this fact, the ignition filament is protected against the development of excessive temperatures which would cause it to burn up after a comparatively few operations. It is immaterial what may be the pressure of the gas supply or its quality, as an increase of pressure or of richness (or both) means merely a shorter interval before an inflammable or critical mixture reaches the ignition filament, and, *vice versâ*, a decrease of pressure or of richness (or both) merely increases the interval required for the proper mixture to reach the ignition filament.

The object of the invention is to provide a device of the character set forth and shown, which device shall be effective in operation for all variations of pressure and quality of gas, while the conductive wire is so situated as to be well protected from high temperatures, whereby its life is prolonged. With this and other objects in view, the main feature of the invention consists in a device comprising (in combination) an ignition-tube, a conducting wire or filament mounted therein, a baffle between the filament and the gas supply whereby the filament is protected, and means for applying an electric current to the filament characterized in that the baffle takes the form of a transverse member arranged within the bore of the tube. The invention also consists in a method of igniting the burners in which a filament is heated by an electric current and is subject to a current of air and gas mixture, characterized by the fact that the filament is protected against excessive temperatures during ignition by the current of pure atmospheric air moving towards the filament and through inlet ports adjacent the filament, whereby "the latter is surrounded and bathed with oxygen."

The illustration shows a side elevation, partly in section, of the apparatus applied to an inverted incandescent gas-burner, and an enlarged longitudinal section of the ignition-tube itself.

Igniting Gas-Burners.

LYON, H., of Gloucester, New Jersey, U.S.A.

No. 1828; Jan. 24, 1911. Date claimed under International Convention, June 11, 1910.

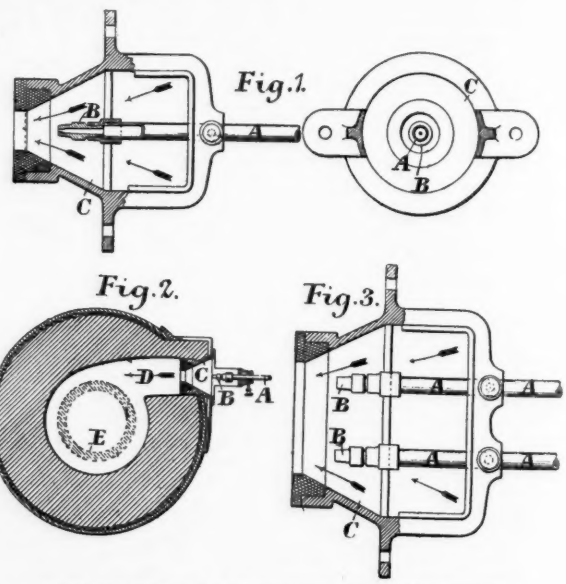
This invention consists in several features similar to those described in patent No. 1827 [above]; the main one being that in the device for igniting the burners, a baffle-plate is mounted in the ignition-tube between the filament through which the electric current is passed and the gas supply. In the tube, an opening or window is formed adjacent to the filament, and so placed that air entering through it moves transversely with respect to the filament. Another feature consists in the fact that the width of the window is substantially equal to the bore of the ignition-tube.

Heating by High-Pressure Gas.

SMITH, E. W., of Acocks Green, and WALTER, C. M., of West Bromwich.

No. 1872; Jan. 25, 1911.

This invention has reference to means for heating furnaces or chambers of various kinds by high-pressure gas—the usual gas pressure being about 10 lbs. per square inch. The invention comprises, firstly, an improved high-pressure atmospheric gas-burner, and, secondly, the combination of one or more burners with a furnace or other combustion and heating chamber in which the gaseous mixture from the burners is expanded and consumed.



Smith and Walter's High-Pressure Gas-Heating Burners.

Fig. 1 is a part sectional plan of the high-pressure gas-burner; also a cross sectional elevation of it. Fig. 2 is a cross sectional plan of a crucible furnace showing the burner illustrated in fig. 1. Fig. 3 is a part sectional plan of a double burner, which is a modification of the burner shown in fig. 1.

The high-pressure atmospheric gas-burner consists of a pipe A, one end of which is furnished with a nozzle B to form a gas-jet—the contracted outlet through which the gas issues being supported in front of the larger end of what is called an "injector cone" C, which is a conical or other gradually contracted orifice formed in the body portion of the burner, or in the furnace wall, and into which the nozzle B is arranged to project. The smaller or outlet end of the cone communicates, through a passage D in the wall of the furnace, with the interior of the latter, which forms an expansion and combustion chamber. The pipe and nozzle can be adjusted nearer to, or farther from, the small end of the injector cone, so as to increase or decrease the amount of air taken into the interior of the furnace by the gas-jet; and the pipe can be fixed in the required position by means of the set-screw.

The gas-jet induces a supply of air from the exterior of the burner (as shown by the arrows), through the injector cone, to the interior of the furnace, to heat the crucible E therein; the interior of the furnace

forming "an expansion and combustion chamber, where the gaseous mixture delivered through the cone is expanded and consumed, and giving a uniform heat at any required temperature." When the pressure of the gas issuing through the nozzle B is increased, an increased quantity of air is (by the increased speed of the gas-jet) delivered through the injector cone into the furnace, and, similarly, when the gas pressure and speed of the gas-jet fall, the decreased speed of the latter takes in a correspondingly decreased quantity of air. Thus the supply of air through the injector cone into the combustion chamber is automatically adjusted by the gas-jet.

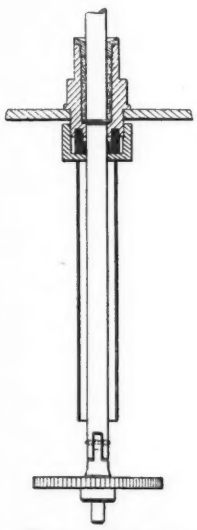
In the high-pressure atmospheric gas-burner illustrated in fig. 3, instead of there being only one gas supply pipe and nozzle arranged to deliver the supply of high-pressure gas to the injector cone, two pipes and nozzles are arranged parallel with one another in the same bracket, but in different holes; so that two gas-jets play simultaneously into the one injector cone, which is oval in form. This burner does not itself provide an expansion chamber of any kind for the gaseous mixture, neither is the gaseous mixture consumed therein; but the interior of the furnace with which the burner is used, and into which the gaseous mixture is injected, serves the purpose of a combined expansion and combustion chamber. In this construction of burner, it is not necessary that the nozzle of the burner should be adjusted for varying the consumptions of gas or air, as the construction described ensures that any increase or diminution of gas pressure at the jet automatically increases or diminishes the quantity of air taken in through the injector cone.

Gas-Meters.

BERRY, J., and GLOVER, W. T., of Oldham, and METERS, LIMITED, of Manchester.

No. 7726; March 28, 1911.

This invention has for its object to provide an "effective packing arrangement for preventing gas escaping along the shaft or spindle extending from the gas to the indicating portion of the meter." Upon the upshaft is secured a collar adapted to bed upon a seating formed in a casing secured in the meter case or in the division plate. The upshaft passes through the casing, which provides two packing glands at its respective ends for the shaft; and each gland is closed by a cap or cover. The collar upon the upshaft and the seating in the packing gland have their adjacent faces of any suitable form—for example, formed as an ordinary mitre valve. Between the lower gland cap or the gland cap in the gas space of the meter, and the packing against which it bears, is a vulcanite or other non-corrodible ring to preserve the packing and prevent its drying. The cap of the other packing gland serves, by means of the packing, to maintain the collar or valve-like ring upon the upshaft in contact with its seating, and so effectually prevent leakage of gas upon the upshaft.



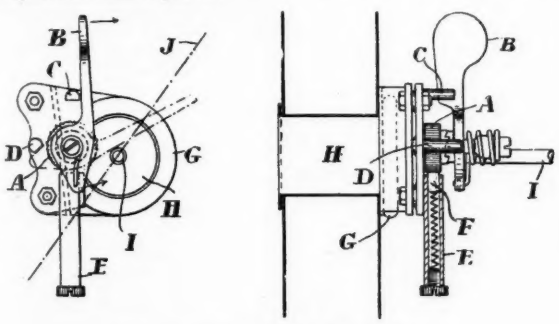
Berry, Glover, and Meters, Limited, Packing for Gas-Meter Spindles.

Kindling Devices for Gas-Stoves.

WYNER, A., of Vienna.

No. 9624; April 20, 1911. Date claimed under International Convention, March 11, 1911.

The object of this invention is to provide a pyrophorous kindling device for gas-stoves, consisting (as shown) of a base-plate in which fixing holes are provided and upon which the pivot for the friction-wheel A is mounted. The wheel is provided with clutch teeth acting with other clutch teeth on the handle B and engaging under the influence of a helical spring coiled around the shaft upon which the handle is rotatable. On the base-plate are two stops C D. A socket E, preferably formed in one piece with the base-plate, forms a guide for the pyrophorous metallic part F.



Wyner's Kindling Device for Gas-Stoves.

As shown, all parts of the device (such as the handle, friction-wheel, and guide sleeve) are arranged upon a plane base-plate, by means of which it can be secured to the angular lugs of a ring G fixed to the wall of the gas-stove at the inlet H for the kindling flame. The device is mounted in such a manner that the spark produced strikes the gas issuing from the kindling conduit I and lights it.

The operation of the device is as follows: If the handle B is rotated in the direction of the arrow, the spring is additionally cocked and its teeth pass inoperatively over the teeth of the friction-wheel A. In this movement, the lower part of the arm strikes against the stop D, thereby preventing the handle from being rotated too far. If the handle is suddenly released, it springs on to the stop C, and thereby rotates the wheel A. The spark thus produced impinges against the gas and lights it.

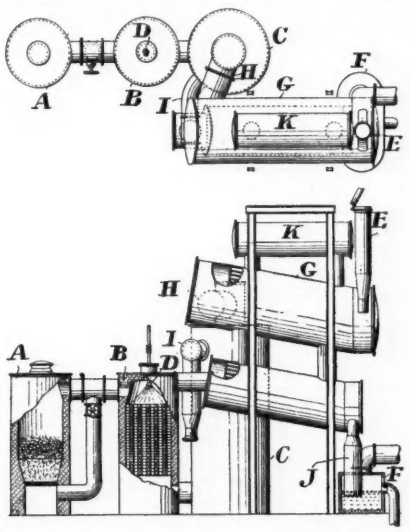
In practice, the device is mounted in an inclined position, so that the line becomes vertical.

Heating Steam Generators in Water-Gas Producers.

THUMAN, F.; a communication from C. S. Chrisman and J. H. Taussig, of Philadelphia, U.S.A.

No. 3024; Feb. 6, 1911.

The principal object of this invention is to prevent the emission of smoke or smoky gases in heating the boilers of carburetted water-gas sets by the blast products and carburetted gases generated therein. The waste or blast products are not permitted to pick up carbonaceous material deposited by condensation from the carburetted water gas or illuminating gas, "so that practically no smoky gases issue from the boilers." This can be accomplished by providing in connection with the boilers separate boiler passages for the blast products and carburetted water gases.



Chrisman and Taussig's Improvement in Water-Gas Generators.

A top view or plan of a carburetted water-gas set or apparatus embodying features of the invention also an elevation (partly in section) are given.

A B C are the generator, carburetter, and superheater of an ordinary carburetted water-gas set or apparatus, and D is the means by which the water gas is carburetted. E is an off-take for the waste products. F is a seal-box through which the carburetted water gas is collected. There are boiler fire tubes, of which some receive the blast or waste products and communicate with the stack, while some receive the carburetted water gas and communicate with the seal-box. The latter tubes may be inclined downwards in the direction of travel of the illuminating gas to facilitate the removal of any carbonaceous matter that may deposit or condense therein. The water is retained in such manner that it contacts with the relatively highly-heated parts of all the tubes; and so not only is steam generated, but the parts of the tubes are protected by the water, so that they are not subjected to destruction by the high heat of the gas as it enters them.

The fire-tubes of the boiler shell G receive blast or waste products from the superheater by way of the connection H, and deliver the products to the stack E. The fire-tubes of the boiler shell receive carburetted water gas from the superheater by way of the connection I, and deliver the gas to the seal F by way of the connection J. The boiler shells are interconnected with the steam drum or chamber K, which is maintained partly full of water, and thus water is retained in operative position or relation in respect to the fire-tubes for generating steam and protecting the parts of the tubes which are exposed to the highly heated gases entering them.

Kingskerswell Gas Supply.—A parish meeting was held at Kingskerswell on Monday last week to consider the proposal of the Torquay Corporation to apply for a Provisional Order authorizing them to supply gas from the St. Mary Church works to the parish. It was decided to ask the Newton Abbot Rural District Council to oppose the Order, and to approach the Gas Company with a view to their furnishing a supply of gas to Kingskerswell.

New Plant at the Tiverton Gas-Works.—In a report presented to the Tiverton Town Council yesterday week, Mr. Clark Jeffery, the Manager of the gas-works, stated that the new sulphate plant and retort-charging machinery were giving entire satisfaction. All the work had been admirably carried out by the Contractors, and during the erection of both the sulphate plant and the machines many small improvements which he suggested were adopted. The charging-machine was a blessing to all concerned, and was very much better than the old method of shovel charging, He suggested the installation of a manual charging-machine, for use when the other was under repair; and the Council agreed to the expenditure of £44 for the purpose.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Construction of Gas-Fire Fuel.

SIR,—I am sure Mr. Ferguson Bell's proposal to standardize the fuel used in gas-fires is on the right lines. We have already done so, and now purchase no fires which do not conform with this requirement.

South Metropolitan Gas Company,
Old Kent Road, S.E., Feb. 17, 1912. CHARLES CARPENTER.

The Ilkeston Gasholder Disaster.

SIR,—I suppose all gas engineers are interested in the correspondence which is going through your columns on the Ilkeston accident and spiral holders generally, and mighty thankful individually that it did not happen at their own works.

I do not want to enter the arena at all; but as I designed and superintended the erection of one of these holders, I should like to mention a small point in their construction, which I think, under certain circumstances, might be of importance.

I think it is the general practice to fasten the guide-rails to the spiral-plates with rivets with round heads. I did not give this matter serious thought until the holder was finished and working—consequently too late to alter. It is very evident that these rivets should have countersunk heads, finishing smooth with the rail.

Supposing a stone or other substance to become lodged in the rail, if it is hard and of any size the roller will probably push it out of the way, being unable to get a grip; but if it is backed up by a rivet-head, it is a different matter altogether, and would probably turn out a serious one. It is a small point; but I thought it well to draw attention to it.

One point in connection with the Ilkeston accident I should like to be put right upon. According to the expert evidence, we are to assume that the inner lift descended rapidly, thereby causing a pressure on the tank enough to overcome the factor of safety and burst it. Why did it not burst the holder? My line of thought is that the tank was a cylinder, and the holder a hollow piston; and as the piston was the weaker, I cannot at present see why it did not burst first. Of course, there is the difference in the area of the walls to take into consideration.

The top plate of the tank being ¼-inch thick, and having a factor of safety of 10·75, it seems to me that, after allowing sufficient metal (at its ultimate strength) to take the strain due to water pressure, there was much more left than the thickness of a No. 12 gauge plate—the thinest in the side of the holder.

A point which ought to help to clear up the matter is this. The holder was evidently supplying the town at the time of the accident. The pressure chart should, therefore, show exactly what happened. If there was a sudden increase of pressure on the inlet of the governor, it would most certainly have shown on the chart, because the governor could not have acted quickly enough to prevent it; also the water must have been blown out of the gauge showing the inlet pressure. It would be interesting to know what pressures were registered on the pressure-chart; also whether the water was blown out of the pressure gauge at the inlet of the governor.

Feb. 16, 1912. M. E.

SIR,—As one who has had some experience in the design and construction of gasholders and steel tanks, but not as an expert, I should like to point out one or two items which seem to want elucidating.

1. The lower tier of tank plates, according to Mr. Ferguson Bell, are subjected to a bursting strain of about 8 tons per square inch, due to water pressure only. The factor of safety is made about 3½ to 1.

2. The stresses exerted by the holder (the floating part) would be very considerable and would it appears be devolved upon the tank sides. What allowance is made for this?

3. One of your correspondents points out that the broken plates were brittle. Those who have read Professor Arnold's and other experts' papers on steel, and the effects of strain on the molecular structure, would be inclined to think that excessive strain has been exerted on these plates for an extended period.

I think that the matter requires more preciseness in details of stresses devolved upon the tank sides. Spiral-guided holders may be as safe as any, if the tank is sufficiently strong, as during a gale considerable vibration would be set up, and considering the rigidity of this type of holder, it appears to devolve into a live load upon the tank.

Feb. 14, 1912. NOT AN EXPERT.

An Unpaid Account.

At the Edmonton County Court last Friday, the Tottenham and Edmonton Gas Company sued John Clifford Parsons, a draper, of Enfield, for £7 18s. 2d., balance of account for the supply of gas and rental of high-pressure lamps and stove. Mr. Westmacott appeared for the defendant. Mr. Randall, an officer of the Company, stated that defendant opened a shop at West Green Road, Tottenham; and the Company fixed high-pressure lamps and stove, and supplied gas. In about three weeks, defendant closed the shop; and he had paid only £1 8s. 1d. off the account of £9 6s. 3d. The Company charged for twelve months' rent of the lamps and stove. The witness produced two agreements which the defendant entered into; and Judge Wheeler said there was a condition that the hire should be for a year certain, that the rent should be payable quarterly, and that a month's notice should be given by either side to determine the contracts. Mr. Westmacott: We have given one month's notice. The lamps were used for only ten days. His Honour replied that the month's notice could be given only after one year's hire. It might be a burdensome contract; but that was no affair of his. There would be judgment for the amount claimed.

PARLIAMENTARY INTELLIGENCE.

OPENING OF THE SESSION.

The Second Session of the First Parliament of the present King was opened by His Majesty last Wednesday, when, as customary, he read the Speech from the Throne. It contained the following paragraph relating to the prevalent unrest in the ranks of labour: "I view with grave concern the prospect of disputes between employers and workmen; and I firmly trust that a reasonable spirit may prevail on both sides, and avoid developments that would seriously affect the trade of the country and the welfare of My people." Remarks on this paragraph in both Houses are given elsewhere.

Next day, the Chairman of Ways and Means (Right Hon. J. H. Whitley) reported that, in accordance with the Standing Order, he had conferred with the Chairman of Committees of the House of Lords (the Earl of Donoughmore) for the purpose of determining in which House the respective Private Bills should be first considered. They decided that the following Bills should originate in the Upper House:—

Bawtry and Tickhill Gas and Water Bill, Belfast Corporation Bill, Bordon and District Gas Bill, Brodsworth and District Gas Bill, Christchurch Gas Bill, Derwent Valley Water Bill, Gas Companies (Benefit Funds) Bill, Herne Bay Gas Bill, Houghton-le-Spring District Gas Bill, Leatherhead Gas Bill, Llanelly Rural District Water Bill, Salford Corporation Bill, Salford Gas Bill, Sidmouth Urban District Council Bill, South Suburban Gas Bill, Swanage Gas and Water Bill, Tendring Hundred Water and Gas Bill, Wakefield Gas Bill, Wandsworth, Wimbledon, and Epsom District Gas Bill, Woking District Gas Bill, York United Gas Bill, Ystradfellte Water Bill.

The following Bills have been presented and read the first time in the House of Commons:—

Annfield Plain and District Gas Bill, Ashborne Urban District Council (Gas) Bill, Bedwellty Urban District Council Bill, Belfast Water Bill, Birmingham Corporation Bill, Bognor Gaslight and Coke Company (Electricity) Bill, Church Stretton Urban District Water Bill, Dover Corporation Bill, Dunstable Gas and Water Bill, Egremont Urban District Water Bill, Fleetwood Gas Bill, Fylde Water Board Bill, Gas Companies (Standard Burner) Bill, Ivybridge Urban District Water Bill, Keighley Corporation Bill, Scunthorpe Urban District Water Bill, Sheffield Corporation Bill, Shipley Urban District Council Bill, Staffordshire Potteries Water Bill, Tavistock Urban District Council Bill, Windermere District Gas and Water Bill.

Petitions against Private Bills.

Petitions have been presented against the following Bills:—

LORDS' BILLS.

Bawtry and Tickhill Gas and Water Bill, by the Nottinghamshire County Council and the Blyth and Cuckney Rural District Council.
Bordon and District Gas Bill, by the West Sussex County Council.
Derwent Valley Water Bill, by the Duke of Norfolk.
Houghton-le-Spring District Gas Bill, by the County of Durham Electric Supply Company and others.
Llanelly Rural District Water Bill, by the Llanelly Urban District Council and the Llandilofawr and Llandovery Rural District Councils.
South Suburban Gas Bill, by the Foot's Cray Urban District Council.
Tendring Hundred Water and Gas Bill, by the Essex County Council, the Harwich Corporation, and the Tendring Rural District Council.
Wakefield Gas Bill, by the Ossett Corporation and the Stanley Urban District Council.
Wandsworth, Wimbledon, and Epsom District Gas Bill, by the Port of London Authority and the Wandsworth Borough Council.
Woking District Gas Bill, by the Conservators of the River Thames.

COMMONS' BILLS.

Annfield Plain and District Gas Bill, by the Annfield Plain Urban District Council and the Alkali Manufacturers' Association.
Ashborne Urban District Council (Gas) Bill, by the Ashborne and District Gas Company.
Bedwellty Urban District Council Bill, by the Bedwellty, Gelligaer, and Mynyddislwyn Urban District Councils, and the Blackwood Gas Company.
Belfast Water Bill, by the Antrim County Council.
Birmingham Corporation Bill, by the inhabitants of the parishes of Edgbaston and Harborne.
Bognor Gaslight and Coke Company (Electricity) Bill, by the Bognor Urban District Council and the West Sussex County Council.
Church Stretton Urban District Water Bill, by the Church Stretton Water Company.
Dunstable Gas and Water Bill, by the Dunstable Corporation, the Dunstable and District Joint Hospital Committee, and the Luton Rural District Council.
Fleetwood Gas Bill, by the Fleetwood Urban District Council and the Alkali Manufacturers' Association.
Fylde Water Board Bill, by the Conservators of the Ribble Fishery District, the Lancashire County Council and the River Ribble Joint Committee, the West Riding County Council and Rivers Board, the Blackburn and Preston Corporations, and the Bowland Rural District Council.
Gas Companies (Standard Burner) Bill, by the East Grinstead, Feltham, and Sunbury Urban District Councils.
Hertford Corporation Bill, by the Metropolitan Water Board.
Ivybridge Urban District Water Bill, by the Plympton St. Mary Rural District Council.

Keighley Corporation Bill, by the Bradford Corporation, the Bingley, Haworth, Oakworth, and Oxenhope Urban District Councils, the West Riding County Council, and the Keighley Rural District Council.

Scunthorpe Urban District Water Bill, by the Glanford Brigg Rural District Council.

Sheffield Corporation Bill, by the Derbyshire County Council, the Doncaster and Rotherham Corporations, the Rotherham and District Chamber of Commerce, the Handsworth Urban District Council, the West Riding County Council and Rivers Board, the Wortley Rural District Council, the Duke of Norfolk, and Earl Fitzwilliam.

Shipley Urban District Council Bill, by the Bradford Corporation and the West Riding County Council.

Staffordshire Potteries Water Bill, by the Newcastle-under-Lyme and Stoke-upon-Trent Corporations, the Kidsgrove Urban District Council, and the Wolstanton United Urban District Council.

Sutton and Mablethorpe Water Bill, by the Mablethorpe Urban District Council.

Swansea Corporation Bill, by the Glamorgan County Council, the Oystermouth Urban District Council, the Swansea Rural District Council, the Swansea Gas Company, and Baron Swansea.

Tavistock Urban District Council Bill, by the Duke of Bedford.

Windermere District Gas and Water Bill, by the Commissioners of the Kendal Reservoirs, and owners, &c., of mills.

LABOUR UNREST AND ITS PREVENTION.

The Value of Co-Partnership.

Readers will doubtless remember that one paragraph of the King's Speech on the opening of Parliament last Wednesday set forth that His Majesty views "with grave concern the prospect of disputes between employers and workmen; and he firmly trusts that a reasonable spirit may prevail on both sides, and avoid developments that would seriously affect the trade of the country and the welfare of the people." The paragraph gave rise to remarks in both Houses.

In the House of Lords, on Wednesday,

Lord FURNESS, in seconding the Address in a maiden speech, characterized the subject referred to in the paragraph indicated as one of the highest importance; and, as it was one of which he had had intimate knowledge and experience, he passed at once to it. He said the most disquieting element manifest at the present moment was the latest phase of the differences between capital and labour. The restlessness and uncertainty of the industrial situation were working incalculable harm to our trade supremacy. What, then, was the remedy for a state of things so menacing to the prosperity and strength of the country? The difficulties which now so seriously handicapped industry would largely vanish if grievances could be at once dealt with on the spot where they arose, before large bodies of men became disaffected. This was an outstanding feature of the co-partnership scheme which he tried in his shipyards. It was given twelve months' trial; the men having undertaken that under no circumstances would they strike, while the firm bound itself not to resort to a lock-out. Unfortunately, the renewal of the scheme was affected by external conditions that were brought to bear upon the men who had worked under it, so that the promising situation in the co-partnership yards came to an end. In his judgment, however, co-partnership, in one form or another, would ultimately be found to be a solution satisfactory to all concerned. So great was his faith in it as a practical solution of this industrial problem, that he was tempted to counsel His Majesty's Government that it could render few services of more vital importance at this time than by advising the Sovereign to appoint a Royal Commission for the purpose of reporting upon the value and expediency of co-partnership as a means of ending industrial strife.

In the House of Commons, in the debate on the Address,

Mr. RAMSAY MACDONALD, the Labour Member for Leicester, moved, as an amendment, to add at the end of the Address: "But humbly represent to your Majesty that this House regrets that, having regard to the existing industrial unrest arising from a deplorable insufficiency of wages, which has persisted notwithstanding a great expansion of national wealth and a considerable increase in the cost of living, your Majesty's gracious Speech contains no specific mention of legislation securing a minimum living wage, and for preventing a continuance of such unequal division of the fruits of industry by the nationalization of railways, mines, and other monopolies."

In the course of the discussion on this amendment,

Mr. PETO said that he was in sympathy with the premises underlying the amendment, but he disagreed with the remedies proposed. Tariff Reformers contended that, under trade conditions such as were common to every other country, when prices rose wages would rise also; but they did not generalize, and say they desired to see prices rise in order that wages might rise also as a consequence. In criticizing the amendment, he objected to the use of the terms "fruits of industry" instead of profits of industry, and expressed a doubt as to the alleged unequal division of profits being remedied by the nationalization of mines, railways, and other industries. The basis of nationalization of industries was the abolition of profits; and therefore he could not see how, under nationalization, its advocates would be likely to arrive at a more equitable division of the fruits or profits of industry. He suggested that a better and more simple proposal would be for the Labour Party to take advantage of the opportunity to purchase one of the coal mines for sale, and work if for the exclusive use and profit of those employed in it. The party would then be able to see how much profit the workmen could get in addition to their present wages. This was why, in the amendment standing in his name, he blamed the Government for not taking steps to forward a fair and equitable division between capital and labour of the profits of industry by co-partnership—a system which would unite their interests and add enormously to the productive capacity of the country. In every case in which co-partnership had been given fair play, it had succeeded beyond all expectation. When he was asked what the Government could do, he said they could do two things. In the first place, they had in their hands an enormous power in the power of taxation; and if they were convinced that it was in the interests of the country to do all they could to forward this great principle, they could see that where a fair and equitable system of profit-sharing was adopted the income-tax and other direct taxes should fall more lightly on those concerned. Secondly, they could give the preference, in Government contracts, to all firms who had adopted the principle, which was the only solution of the friction between capital and labour. He concluded by moving to leave out all the words, in the amendment before the House, after the word "living," in order to add "Your Majesty's Ministers are not taking steps to forward a fair and equitable division between capital and labour of the profits of industry by co-partnership, which would unite their interest and enormously add to the productive capacity of the country, cheapen the cost of commodities, increase the country's power to compete in all other markets, give the wage-earners a human interest in life and work, and place them on a moral equality with every other class."

Lord HUGH CECIL, in seconding this amendment, discussed the proposed remedies of the hon. member for Leicester, and submitted that competition would not be superseded by the nationalization of certain industries. Human nature would remain as it was. The workmen in the widest sense—all the persons employed in a nationalized industry—would prefer their own interests to those of other people; and all that nationalization would do would be, not to get rid of competition, but to change the arena of battle. People would then compete at the polling-booth instead of in the market as now. With regard to the fixing of a minimum wage, he contended that it would be an artificial minimum; and he said he could not believe that anyone, having regard to the extreme fluidity of capital, could suggest that a minimum wage could be applied by law to a single commercial community without disastrous results following upon such a course. One of the most serious causes of unemployment at the present time was the practice, partly introduced by Trade Unions and partly the result of public opinion, of the payment of a standard wage—a tolerably uniform wage—for the same class of labour. Why could they not have an elastic system of reward—a higher wage when trade was prosperous, and a lower one in times of depression? He believed that, with such a system, unemployment, even temporary, would be done away with. With respect to co-partnership, it would remove many of the existing difficulties. The labourer had a share in the capital, his representative was on the board of management, and he knew exactly the condition of the business. If this system prevailed over the whole area of commerce and industry, what would happen in time would be that what were called wages would be the smaller, and the share of the profits the larger, portion of the labourer's remuneration.

Mr. T. TAYLOR, as a member of a firm who had introduced profit-sharing, said the system combined the best points of both Socialism and Individualism; and if properly carried out it would stimulate the production of wealth—an object which was too often lost sight of in the struggle for the apportionment of the wealth produced. Wherever profit-sharing had been genuinely tried, it had been a success.

Mr. ROBERTSON remarked that while the Government were heartily in sympathy with profit-sharing, he did not think any evidence had been brought forward that they could do anything towards bringing about its adoption.

Sir FORTESCUE FLANNERY said that, as a Director of one of the Gas Companies in South London, he had had ten years' practical experience of the system of co-partnership introduced by the late Sir George Livesey. The basis of it was, first, that full standard wages should be paid. When first engaged, the wage-earners did not enter into the profit-sharing class. This was a privilege reserved for those who demonstrated, by steadiness, industry, and efficiency in their work, that they were fitted for admission into partnership with the great body of workers and shareholders. It was regarded as contrary to the principle of co-partnership if, when a man received his bonus, he did not avail himself of the opportunity to re-invest the money in the concern in which he was employed. In the South Metropolitan Gas Company, nearly £500,000 of the capital belonged to 5000 of the workmen; and therefore during all the labour agitations there had never been the least fear, by either employers or employed, that the agitation would reach their establishment. [Cheers.] The workmen also elected from among their own number three workmen, at daily wages, to act as Directors of the Company; and no more level-headed men sat round any Directors' board than were these Workmen-Directors. He urged the Government to devote their attention to co-partnership, because the solution of the problem of industrial strife and difficulties lay in the common sharing of the results of the common enterprise, and in the common management by employers and employed of the business which brought them together and formed their joint livelihood.

Sir A. MARKHAM said the House were asked, by the amendment of the hon. member for Leicester, to nationalize all the means of production; for it was not restricted in its terms to monopolies. Before the appearance of the Labour Party, there had been a great deal of feeling among Liberals in favour of the nationalization of railways and of such monopolies as the supply of gas and water. He had endeavoured to bring the co-partnership system into operation in his own business, and had met with difficulty because the men suspected that he had some ulterior motive. There could be no system of co-partnership unless the standard rate of wages was paid to the workmen concerned; and when this was done, it was inexcusable that Trade Unions should object to the men receiving a bonus.

Mr. KEIR HARDIE said he was glad so many members had expressed academic approval of the system of profit-sharing. If this were universally adopted, it might allay industrial unrest for a time; but it offered no final solution of the industrial problem, because it still left the profits to be obtained by competition. It would keep the workmen divided, whereas the tendency of capital and labour now was to come together in ever-increasingly large groups.

After some further debate, the House divided on the first amendment; and it was lost by a majority of 181. Mr. Peto's amendment was then put; and, on a division, it was lost by a majority of 98.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of the Company was held last Wednesday, at De Keyser's Royal Hotel, Victoria Embankment, E.C.—Mr. CHARLES CARPENTER (the Chairman) presiding.

The SECRETARY (Mr. F. M'Leod) read the notice convening the meeting, and the minutes of the last ordinary and extraordinary general meetings. The seal of the Company having been affixed to the Register of Proprietors,

THE CHAIRMAN'S SPEECH.

The CHAIRMAN said: Ladies and Gentlemen,—In moving the adoption of the report and accounts for the past half year [given in the "JOURNAL" for Feb. 6], I think I may safely assume that you share with your Board their satisfaction with the working results of the undertaking.

A RECORD YEAR.

The year 1911 has been a record one as regards the quantity of gas the Company have sold. It is true that, instead of the usual increase of consumption during the last six months, we had a decrease; but it is not necessary to look any further for the cause of this than in the abnormal climatic conditions we have enjoyed or suffered from, according to the standpoint we take up. Our business rests upon a broader basis than one of lighting; and while this enormously strengthens our position, it is obvious that a mild or a severe winter will make a very great difference in our consumers' requirements for heating purposes. We have ample evidence that this is so in the fact that if we compare our daily output—and it is quite easy to do this on days when temperatures are at the usual winter figures—we find we have obtained very substantial increases in our deliveries. Unfortunately, however, the days have been few and far between; and their value has been more than set off by the greater number of occasions when the temperatures have exceeded the normal figures. In the latter part of December, for instance, our daylight consumption fell off by about 10 per cent. On the other hand, during the cold weather we experienced at the end of January and the beginning of February our increases have reached as much as 28 and 29 per cent. The figures are interesting, because they give point to an observation often made—that a large quantity of gas is used for other purposes than lighting. I said just now our business rested on a broader basis than one of lighting; and I had in mind the increasing use of gas for heating and manufacturing purposes.

INCREASED RECEIPTS FROM RESIDUALS.

But another tower of strength to us is our residual products; and you cannot but have noticed from the balance-sheet the satisfactory character of these receipts. The improvement in value mainly comes under the headings of tar and ammonia products, and is partly due to better working and partly to the higher prices obtained. In the former case, the advantage arises out of the more scientific manner in which we carbonize our coal—we make more of the valuable, and less of the poorer, bye-products than used to be the case. For instance, we have benzol. The production of benzol from tar is two or three times as much as it was ten years ago. On the other hand, the production of pitch, which is the lowest-grade product, is not so high as it used to be. But the result of it all is that the price we get has improved by the better class of article we are disposing of. With regard to the articles we are selling, the United States market continues a good one for creosote; and the use of sulphate of ammonia as a fertilizer is extending there as in other countries. A large proportion of creosote is bought in the United States for preventing decay in timber. In addition to this, the United States is also becoming an increasingly valuable market for ammonia products; and, so far as we can see, the outlook for residuals is a very favourable one.

HIGH-POWER LIGHTING.

Then, going through the report, the next interesting point dealt with is with regard to the use of high-power gas; and I am pleased to say that the hopes formed of this when I brought it under your notice have been more than realized. As the report tells you, we have now 1870 lamps on this principle in use, and the number is continually increasing. There is certainly no method of artificial lighting giving such brilliant and pleasing results; and it is especially appreciated in the principal shopping centres of South London. From Clapham in the west to Woolwich in the east, the district is provided with installations for the furnishing of light by this improved method of burning gas.

THE COMPANY'S INDOOR INVERTED BURNER.

For the last two years or so, we have been engaged upon the design of an inverted burner mainly for indoor use; and I am pleased to say our efforts have met with a large measure of success. The most common trouble in the use of the inverted burner arises from the great amount of dust contained in the London atmosphere, and which, when deposited in the air-passages of the burner, disturbs the proper mixing of the gas and air in the bunsen flame. In the burner we have designed, this difficulty has been overcome; and, moreover, no screws are required for affixing it to the fitting, nor holding the glass or silk shades used for ornamental purposes. We have already some thousands of them in use; and we look forward to the time when they will be universally employed in our area of supply. The matter is of great importance. A very large proportion of our load is a lighting one; and any improvement to strengthen this, which is really the backbone of our business, must be very helpful to us in the long run. I may perhaps take up a small portion of your time in showing you the burner. This is the burner; and the glass (which is usually put in with screws, and which are often very troublesome because as the burner gets hot they expand and crack the glass—screws are no longer required) is put in and just twisted round, and so maintained in its place. The other improvement is in the burner itself. The ordinary gas-burner is screwed to its fitting; and the only advantage of the incandescent burner is that its luminosity is due to the bunsen flame. With a bunsen flame, it is not necessary to have an air-tight or gas-tight connection between the burner and the source of supply. With a fishtail burner, the burner must be fitted tightly into the pipe supplying the gas; but with a bunsen burner, it is not necessary to have a tight connection, because you are not burning gas direct, but after being mixed with a certain proportion of air. In the new burner, this fact has been taken advantage of; and we have a burner here as easily removed as the ordinary lamp used for electrical current. This fitting has an attachment to it for lighting, and is now ready to be lighted; but I cannot light it as we have no gas here. That is all that is required to couple it up with the fitting and to get light from it after the mantle has been put on. The top of the burner is made of Doulton ware by a special process, which we owe to a French inventor. The pottery is cast in a mould, very much as metal is cast, and put into the kiln. The particular type of burner which you see in my hand we were only able to put on the market last year; but we have already some 13,000 or 14,000 in use. In this connection, I may say that we have had to extend our experimental workshops as well as our laboratories. Owing to the organization we have for dealing with our consumers, we get into touch with their requirements quicker perhaps than many manufacturers; so that to an increasing extent we have not only to invent, but to work out, the inventions necessary to maintain our supremacy in our various fields of supply. The more economic means of using gas both for cooking and heating is one of these; and although the first effect of these improvements is to check consumption, we benefit in the long run by strengthening the basis upon which the success of our business depends—namely, the satisfaction of our consumers.

INCREASED MAKE OF GAS PER TON OF COAL.

From the use of gas I must now turn to its manufacture; and it is with great pleasure that we record in the report the fact that the make of gas has now risen to 12,392 cubic feet per ton of coal. The significance of this figure will be best realized if I say that, had we been working in 1911 to the same standard as ten years ago (1901), we should have had to purchase last year more than a quarter-of-a-million tons of coal more than the quantity we actually required. This is a very significant fact. I think this working reflects very great credit upon the carbonizing department; and I know that it could not have been reached without unremitting care and watchfulness and intelligent working upon the part of all concerned, from the engineers to the retort-house men.

PURIFICATION—IMPORTANT DEVELOPMENTS.

It is customary at these meetings to run through many figures in the balance-sheet; but as a matter of fact on this occasion there is not much in them which calls for attention. They are very similar to those of a year ago; but there is one item in which there has been great variation, and that is in purification costs. Our costs for purification have gone up to the considerable figure of £21,000 in the half year. Not without very careful consideration have we at our two largest works reverted to lime in a manner which is not intended to be permanent, but temporary—awaiting the results of investigation upon which we have been engaged for several years. We have, by the light of recent chemical and physical knowledge, reinvestigated the problem of purifying coal gas, which has engaged the attention of gas engineers and chemists during the last half century or longer; and, as a result, we erected a plant which has for some months past dealt successfully with one-twentyfifth of our maximum production. The plant has been working for some months. We put it out of action a few weeks ago, in order to see the condition it was in after the period of working; and we found that, to all intents and purposes, it was in the same condition as when it was started. We propose to extend this during the present year to the whole of the gas made at the Old Kent Road works, and, if the extension is successful, to our entire production in 1913. Your Board realize that we not only want to sell the cheapest gas but the purest; and there is every likelihood of this aim being attained.

THE COAL OUTLOOK.

So far, I have dealt with what may be called the every-day matters of our business. These are within our own control; and our fitness is reflected in the methods by which we handle them. Overshadowing them in importance is the supply of our raw material—coal. Fourteen years ago, our gas coal was put on board ship in the Tyne for 6s. 3d. per ton. Our last year's requirements were purchased at 44 per cent. increase, or (say) 9s. per ton. I cannot but think that there must be something wrong if there is not in such a price ample to pay a liberal and satisfying wage to the workers engaged in the coal-winning industry, and at the same time provide a handsome profit to those who have invested their money in it. For, remember, coal is a raw material, and not an artificial product; and it is wrought in such quantities as to justify the application of most economic methods to its production. Yet it is improbable that the workers engaged in it were ever more unsettled than they are to-day. There is no doubt that, in the Durham coalfield at any rate, much of the unrest is traceable to the unsatisfactory conditions brought about by the working of the Mines Regulation Act, the stereotyped regulations of which have undoubtedly entailed a good deal of discomfort and inconvenience. Unfortunately, too, the basis of remuneration does not depend upon decreased working costs and improved output from plant—always a very costly matter—but upon the amount by which the other industries of the country can be taxed in the price they have to pay for their fuel. If there is a shortage of production by reason of bad working—and this is one of the most common complaints of the mine owners—there comes a shortage of supplies. Then prices go up, and the miners' wages follow, because they are regulated by the price which is obtained for the coal. Our only remedy is in the accumulation of large stocks sufficient in quantity to tide us over difficulties longer than those the country as a whole could possibly endure. But the proceeding is a costly one, for not only is a large sum of money lying idle in these coal heaps, but the material itself deteriorates, and gives trouble by spontaneous combustion, as you will have noticed from the various reports where reference is made to loss by heating. The extra cost of handling, too, amounts to a very

substantial figure. However, we must accept these disadvantages as inseparable from our business so long as the interests of Capital and Labour in the coal industry remain as separated as they appear to be to-day.

CO-PARTNERSHIP.

Our thoughts in this direction turn naturally to the principles of co-partnership; and I notice with great satisfaction that there seems an awakening in all quarters as to their value. In our own case, I have but to tell the continued story of its success. Certainly our relations with our employees were never happier than they are to-day [applause], nor were we ever more convinced of their loyalty and good-will.

THE NATIONAL INSURANCE BILL.

The statement in the report that a Committee of our workpeople made strenuous efforts to obtain exemption from the provisions of the National Insurance Bill is but the baldest record of their labours. Over a thousand letters were sent to, or received from, Members of Parliament and others interested; while 167 Members of Parliament were actually interviewed. I believe the Committee did very useful work by educating Members of Parliament as to the meaning of their own Bill; and although some useful amendments proposed by them were sacrificed owing to the guillotine, yet the Committee have certainly left their mark upon the Bill in one or two ways as the result of their representations. In this connection, I may say it had been earnestly hoped that the Company's sick and medical fund, which has been in existence for more than seventy years, might continue its usefulness as an "approved society" under the Act. But after the most careful consideration on the part of the employees, who have held meetings and discussed the Act in all its bearings, they have most reluctantly come to the conclusion that such a course is impossible and incompatible with its provisions, though they are quite satisfied they would get a better return as sick pay for their contributions to the Company's fund than they can hope to obtain outside it. This explains the strenuous opposition which the Committee of our workmen gave to the Bill, and how they endeavoured to obtain exemption from its provisions. I have here a very long report which they made. I will not trouble you with it all; but I should like to read the concluding paragraph in confirmation of what they say earlier in the report: "We may mention that exemption has been extended to others that were not at first included." [They think this is the result of their lobbying and their endeavours to obtain some concession in this respect.] "The wage limit of insurance has been removed; the qualifying number of members for approved societies reduced; infectious disease benefit added; and many other stringent rules much relaxed. But the one thing we have sought for, and hoped to obtain (that is, the Committee representing the entire interests of all the men)—namely, a contracting-out clause—has been denied in face of the unanswerable arguments afforded by the accident returns." I mention this as showing the earnest endeavour that was made by the Committee to get the Bill drawn so as to suit our requirements, and their great disappointment that, after all their efforts, they have come to the conclusion that we cannot become an "approved society."

THE LATE MR. ROBERT MORTON.

The remaining matters dealt with in the report—namely, those referring to the election of Directors and Auditors—will come on later by separate resolutions. But before I sit down, I should like once more to take the opportunity of expressing the sorrow and regret felt by the Board at the death of Mr. Robert Morton, whose services to the Company during the twenty-five years he sat at the table were second only to those rendered by Sir George Livesey himself. I move: "That the report and accounts now presented be received and adopted, and the report entered on the minutes."

The DEPUTY-CHAIRMAN (Mr. Frank Bush), in seconding the motion, said that, after the very full and interesting statement made by the Chairman, it was quite unnecessary for him to add anything.

The CHAIRMAN: Before putting the motion to the meeting, we shall be very pleased to hear any questions and to answer them to the best of our ability. The matter is now open for discussion.

REMARKS BY A SHAREHOLDER.

Mr. E. KIMBER said the report and the Chairman's speech were highly satisfactory. The South Metropolitan Company had the advantage of working under the co-partnership system. The whole credit for this lay with the late Sir George Livesey, who proposed it and carried it through, and the Company were now able to show to the world that co-partnership was a system to prevent strikes. He thought the Directors were very wise in laying down an extra stock at Greenwich to meet the possibility of a coal strike. He was glad to notice a slight increase in the quantity of gas made per ton of coal, and the increased number of slot consumers.

The motion was then put and carried unanimously.

THE DIVIDEND.

The CHAIRMAN next moved: "That a dividend at the rate of £5 9s. 4d. per cent. per annum be now declared; and that the warrants be transmitted to the registered addresses of the proprietors by post."

Mr. W. H. CUPIT seconded the motion; and it was carried unanimously.

RE-ELECTION OF DIRECTORS AND AUDITOR.

The CHAIRMAN: I have now to move: "That Mr. John Mews be re-elected a Director of this Company." Mr. Mews is one of the two remaining Directors of what I may call the old Board—that body of men who for so many years sat with, and supported, the late Sir George Livesey in the epoch-making work he carried out, not only for the benefit of this Company, but for the gas industry at large.

Mr. JOHN EWART seconded the motion; and it was carried unanimously.

The CHAIRMAN: I have now the pleasure to move: "That Mr. Frank Bush be re-elected a Director of this Company." Mr. Bush's name is, I think I may say, a household word where gas matters are concerned, and certainly those of our own Company. He has been an encyclopædia on all gas matters during the last forty years; and he has not only won the regard of all with whom he has come into contact, but he also retains that regard.

Mr. JOHN EWART seconded the motion, which was carried unanimously.

Mr. FRANK BUSH: Ladies and gentlemen, by your kind and unanimous vote you have re-elected me to a seat on this Board for a further period of three years. During that time I shall endeavour, to the best of my ability, to study the true interests of the Company. And in using the word "company," I include the three partners—shareholders, consumers, and employees of all ranks. Let me again thank you for my re-election. It is a position I greatly appreciate. I also desire to record my thanks to the Chairman for his kindly reference to me, and also to my seconder.

Mr. Charles Mortimer was then reappointed an Auditor.

A NEW AUDITOR.

Mr. GEORGE HOWLETT moved the appointment of a new Auditor, in the person of Mr. Charles Pelham Crookenden, in the place of Mr. George M. Footner, resigned. With regard to Mr. Crookenden, there was a continuity of service; his father was Secretary of the old Phœnix Gas Company; he was a chartered accountant, and well up in all business of accountancy.

Mr. KIMBER seconded this motion; and it was carried unanimously.

Mr. C. P. CROOKENDEN said he was very much obliged to the shareholders. For the last thirty years he had been associated with gas and water undertakings; and it would be a great pleasure to him to act as Auditor to a sound and progressive Company such as the South Metropolitan was.

DISPOSAL OF LAND.

The CHAIRMAN: I have now to move two formal resolutions with regard to the disposal of some of our land at Rotherhithe, Greenwich, and East Greenwich. When we bought the property we now hold there, the boundary of it was a very irregular one. The land was market gardens; and you know how the lines of demarcation between one field and another are very erratic and irregular. We have had an opportunity of straightening these in conjunction with our neighbours, who are also holders there of property adjoining our own. The new boundary will be of advantage to ourselves and also advantageous to them. The area is not very large—rather more than three acres; but it is necessary that your formal consent should be given to what is proposed to be done. I now move the first resolution.

The resolution was carried unanimously.

The CHAIRMAN: The second resolution deals with a small piece of land at the Rotherhithe works. These works are situate in a very congested district; and the roadway there is something like 20 feet in width. There is a great deal of traffic running through it to the docks; and the proposal is that we should give up a triangular piece of ground about 100 feet long and 9 feet in width at its base. In exchange for this, certain restrictions will be relaxed in respect of our buildings on the opposite side of the road. We are assured by our valuers that we shall have fair value for the exchange. I now move the second resolution.

Mr. FRANK BUSH seconded the resolution; and it was carried unanimously.

The CHAIRMAN announced that this concluded the business.

VOTES OF THANKS.

Mr. HOWLETT, in proposing a hearty vote of thanks to the Chairman and the Board for their conduct of the business of the Company during the past half year, said the shareholders had not only had what they always had from the Chairman—viz., an interesting and technical speech—but also a scientific lecture with an experiment. From what he knew of the new burner, he thought that it would be a great success. In their Workmen-Directors they had men who were acquainted with the inner work of the Company—in fact, they were a sample of the best workmen who took part, without fear or favour, in the conduct of the business. He felt sure that such a Board was likely to lead to future success; and, while they had such a Board and Chairman, the shareholders hoped they would live long to occupy their positions.

Mr. KIMBER seconded the motion.

The CHAIRMAN: Mr. Howlett, Mr. Kimber, Ladies, and Gentlemen,—On behalf of my colleagues and myself, I thank you very heartily for this renewal of your confidence; and I am sure that any body of men would do a great deal to win the praise which has been so lavishly accorded by you to us, and supported by your fellow-shareholders in this room to-day. However, I cannot sit down without drawing attention to a matter which is not of less importance; and that is how much we owe to the permanent officials of the Company. In thanking you for your very kind vote, I would like to propose a very hearty vote of thanks to those officials on whom rests the great brunt of the work of the Company. Mr. Gibb (the Chief Engineer) is not only a thoroughly qualified and technical gentleman, but he has the gift, which everyone has not, of attracting the best of those working under him, and getting them to put forward their very best efforts for the welfare of the Company. In Mr. M'Leod, our Secretary, we have a most admirable officer, who not only does his work most thoroughly and conscientiously, but everything that directly or indirectly can concern the welfare of the Company always has his most careful and earnest attention. Therefore, I have very great pleasure in proposing a vote of thanks to the officers and workmen. I must not leave the latter out, as they are not the least important to us of this Company.

Mr. FRANK BUSH: I heartily concur with all the Chairman has said about the staff. We have a thoroughly loyal and devoted staff—we have thoroughly loyal and devoted workmen; and I am sure it will be a great satisfaction to the shareholders to know that the staff and workmen, as co-partners, have the important stake in the Company of £301,490 of stock.

The motion was carried unanimously.

Mr. W. DOIG GIBB said, on behalf of the technical staff, he desired to thank the meeting for being so unanimous in considering they were

worthy of thanks. They all did what they could; but he assured the meeting that the more he knew of the South Metropolitan Company, the more he was convinced that the bonds between the workmen and the officials were no mere figure of speech—they were really strong and sincere. The longer he stayed in the South, the more he felt that there was something very strong and very good that must be put aside before there could be any labour trouble in the South Metropolitan Company. He would go farther than this, and say that another experience of his had been the extraordinary sympathy between the consumers and the Company. It was most remarkable, and he should say unique, that the consumers were so kindly disposed and so well looked after. Both sides seemed to have a fellow feeling that they were all working together; and this all went to one common end—viz., a good dividend.

Mr. F. M'Leod said, on behalf of the clerical and commercial staff, he thanked the meeting very much indeed for their kind vote. It was to all of them a great encouragement to have from time to time words of commendation; and to none was it more encouraging than to those gentlemen who had to go out and fight their rivals on the Company's behalf. It was the interest of the Company that the staff were day and night looking after; and he was sure they would highly appreciate the commendation expressed, which he should be pleased to convey to them. In their name and in the names of all the clerical staff, he thanked the meeting for their vote.

The proceedings then terminated.

CROYDON GAS COMPANY.

The Ordinary Half-Yearly Meeting of the Company was held last Friday at the Offices, Katherine Street, Croydon—Mr. Charles Hussey, J.P., in the chair.

The Secretary (Mr. W. W. Topley) read the notice calling the meeting; and the Directors' report and accounts were taken as read.

Increased Prosperity.

The Chairman, in moving the adoption of the report and accounts, said the accounts for the past half year, even on a cursory glance, showed that the satisfactory progress of the Company during the two preceding half years had been fully maintained; and the impression would not be dispelled on closer examination, whether it be directed towards evidences of continued growth or of profit-earning power. It would be seen that the net earnings exceeded the sum required for dividends by some £5300, notwithstanding the facts that the price of gas had been lower by 2d. than a year ago (representing a gain to consumers of £5700), and that the consequent increase in dividend, and in the sums accruing as bonus to the co-partnership employees, amounted to £1400—these causes together adding £7100 to the charges of the half year. The sales of gas had, by reason of the reduced price, realized less by £2200; but the quantity sold was greater by 3·71 per cent.—representing nearly 24½ million cubic feet. This increase would compare favourably with that of most other undertakings, and might, he thought, considering the heat of the late summer and the mildness of the early winter, be regarded as very satisfactory.

Large Variations in Demand.

The recent "cold snap" had brought out in a striking way the extent to which gas undertakings were nowadays called upon to respond at short notice to the fluctuating requirements of the community, not only for light, but for comfort. On the previous Monday week, the quantity of gas sent out (which established a "record" in their history) exceeded by 27 per cent. the sales of the corresponding day last year; and if comparison were made with 1910, they had an output of 6,374,000 cubic feet, as against 4,060,000 cubic feet—an increase in one day of 2,300,000 cubic feet, or more than 50 per cent. Such figures as these showed that the vigorous policy pursued by the Distribution Department, under the able and energetic management of its Superintendent (Mr. Sandeman) was bearing good fruit. It would be seen that the number of gas-stoves—cooking and heating—in use had been increased in the half year by 2163. This number much exceeded that reached in any past half year in the Company's history.

Coal and Residuals.

On the financial side of the working, they had been helped by the facts that both coal and oil had been purchased (under contracts made some time ago) at favourable prices, and that residuals—notably tar and sulphate of ammonia, had yielded an excellent return. With regard to tar, they had been able to sell good quantities for purposes of road treatment in, and immediately around, their district; and a small shipment had just been made to South Africa for use in like manner. The continued good price of sulphate of ammonia was, at all events partly, due to the efforts of the Sulphate of Ammonia Committee, who had, by educating possible users in the merits of this form of artificial manure, and by acting in concert with bodies of a like nature in America, France, Germany, and Belgium, fully justified the contributions which they, and other gas companies, had placed in their hands. Expenditure of this kind for joint action was beneficial to all; and he would express the hope that an increasing number of gas undertakings might see their way to share in it. The purchases of materials generally, made in the early part of last year for the twelve months ending in June next, were on very favourable terms; and this had had some share in contributing to the profits for the half year.

Carbonization Returns.

In mentioning the foregoing combination of favourable circumstances, he did not wish in any way to belittle the excellent work that had been done in the manufacturing department, for which all engaged at the works—from Mr. Helps and Mr. Caddick downwards—were entitled to receive great credit. The savings under the head of coal and oil—equal to nearly 1½d. per 1000 cubic feet—were due in large measure to the excellence of the carbonizing results, as the proprietors would readily understand when he told them that the quantity of gas made per ton of coal used had been about 10 per cent. more—12,600 cubic feet, against 11,400 cubic feet.

The Future.

If, now, they turned for a moment from the past to the immediate future, they were entitled to expect that the present half year would again show satisfactory results. The same conditions as to prices prevailed as in last half year. The only disturbing outlook was the possibility of trouble between the coal-owners and miners. This cloud on the industrial horizon had naturally given to the Directors, as to those of other gas companies, some amount of anxiety—the more so as the disturbance of traffic resulting from the railway trouble last year had affected the transit of heavy goods (such as coal) for a far longer time than one would at first expect, and continuous difficulties had been experienced in obtaining deliveries. The reserves they had, however, aided by the possibilities of the carburetted water-gas plant, rendered it extremely unlikely that any serious trouble would arise from this cause. He might say that the anxiety the Directors had experienced had not been lessened by that day's reports; but he hoped, and hoped still, the matters in dispute might be settled satisfactorily. If not, it would be an anxious time for the Board and officials. But they would do the very best they could under the circumstances. How far conditions of cheap coal and other materials would continue after June next must be largely a matter of conjecture. There was no doubt that there would be some—possibly a considerable—increase in the price of coal. The detrimental effect of this upon the revenues of gas companies was, however, considerably lessened by the fact that with it usually went a rise in the values of residuals, especially of coke.

Office Extensions and Distribution Work.

It would be seen from the report that extensions of the chief offices were in contemplation, and that to provide for these the Directors had taken advantage of an opportunity which arose to purchase the freehold of the adjoining property fronting Park Lane. The amount of work carried on from the offices was very large, and had increased during recent years in far greater proportion than had the business done, if the latter be measured by the sales of gas alone. This was due to the fact, well known probably to all present, that, as was the case with gas companies generally, they found it beneficial to the customers and essential to the maintenance of the business, to attend to their requirements in far greater detail than was formerly considered necessary. For instance, the Company had for some years given free attention to the maintenance of consumers' burners, providing the labour free, and only charging a reasonable price for the materials supplied. This work alone now necessitated the employment of forty attendants, dealing with the burners of nearly 5000 consumers, as against 800 slightly more than three years ago. Then they had fixed in many parts of the district installations of high-power burners on contract terms. These required compressing-plant and daily attention to lighting, extinguishing, and maintenance. They had in use more than 120 of these high-power lamps, and the number was growing rapidly. Another work, typical of the many services rendered to consumers, was the conversion of water-slide chandeliers to safer, neater, and more efficient pendants. This they decided some time ago to undertake free of charge, and a large number of fittings had been, and were being, altered by the Company, to the great benefit of the consumers. The days were past, and were not likely to return, when the energies of a gas company outside the works were mainly confined to connecting to their mains the houses of those residents who applied for a supply of gas. The extension of the business during recent years had been won, and was maintained, only by ceaseless attention to detail and persistent efforts to improve the service given, and to bring to the notice of consumers new and better ways of using the commodity supplied. The widening of the sphere of work was not likely to lessen in the future—rather would it increase. The mere growth of work arising from the increased number of the consumers was striking. He found that, comparing the year 1911 with 1910, they fixed or removed 18,603 stoves, against 16,467—an increase in one year of 2136. The meters dealt with last year numbered 12,355. Looking at these figures, it need be no matter for surprise that within six years of the last extension of offices, stores, and workshops, they found it necessary to further considerably enlarge the accommodation. As part of the scheme of extension, it was proposed to increase the facilities for displaying apparatus for the varied and ever-increasing purposes to which gas could be applied.

The Balance.

Returning again to the accounts, it would be seen that a further sum of £2000 had been carried to the renewal fund, to meet such charges for alterations or renewals as fell upon revenue, and that £1000 had been written off in respect of the old Caterham works, leaving a carry-forward, after payment of dividends, of £19,633—an increase of £8000 over a year ago, or quite sufficient to pay three-quarters of the half-yearly dividend that would become due in August next.

The Deputy-Chairman (Mr. T. Rigby) seconded the motion.

The Corporation and Public Lighting.

Mr. H. D. Hall, having congratulated the Directors on the report, said he had been reading the reports of two other Companies in which he was interested—the Gaslight and Coke and the South Metropolitan Gas Companies—and he saw that both of them had sold less gas during the half year. Therefore, it was particularly gratifying to have a report showing an increase of 3·71 per cent. during the half year, particularly as in Croydon they had a very energetic opposition in the shape of the electric light. He thought the public lighting of Croydon where incandescent gas-lamps were used showed a wonderful improvement. He felt sure if the question of the public lighting was pushed further, and it was put in proper terms before the Corporation and others, they must see that, through the incandescent gas-burner, they obtained not only a better light but a cheaper light than from electricity. He also congratulated the Directors and the responsible officials on the make of gas per ton of coal.

The Chairman remarked that the high-pressure gas-lamp gave a far better light than could be obtained by electricity. Mr. Hall had suggested that the Directors ought to do all they possibly could to get the

Corporation to adopt that light in the streets. Some time ago, the Directors offered to light half a mile of the main street of Croydon by high-pressure lamps at the Company's expense, and to take them down again, if desired, without costing the Corporation a farthing, in order to get public opinion as to which was the better light for the purpose. But the Corporation declined with thanks. [Laughter.]

The motion was unanimously carried.

Mr. WILLIAM CASH, F.C.A., moved the declaration of dividends, all less income-tax, at the following rates per annum: 15 per cent. on the "A" stock, 12 per cent. on the "B" and "C" stocks, 5 per cent. on the "D" stock, and 10 per cent. on the "E" stock—all less income-tax. This resolution he said was usually in the hands of Mr. Corbet Woodall. He was sure they were all sorry Mr. Woodall was not able to be with them that day. He had not been very well lately; and it was thought advisable for him not to be present. The proprietors, however, would be glad to know he was decidedly better; and that he would shortly be with his colleagues again, he (Mr. Cash) had no doubt. As to the resolution, the dividend had been thoroughly well earned. There was the substantial surplus of £2300 to be added to the carry-forward, making it £19,633. The proprietors were glad the price of gas was as low as it was now, and that increased dividends were being paid. An additional sum was also being paid to the employee co-partners—the amount this time being £1300, against £700 a year ago. The proprietors would, he was certain, be pleased to hear the workmen were sharing in this way in the prosperity of the Company.

Mr. PERCY H. HALL seconded the motion.

Moved by the DEPUTY-CHAIRMAN, and seconded by Mr. W. J. RUSSELL, Mr. William Cash was re-elected a Director. Proposed by Mr. SAMUEL SPENCER, and seconded by Mr. CASH, Mr. Percy H. Hall was also re-elected, as was Mr. W. J. Russell, on the proposition of the CHAIRMAN, seconded by Mr. SAMSON. Regarding Mr. Russell, the Chairman made the interesting statement that he had been connected with the Company for 49 years. He commenced his services in 1863 as office boy. Besides the Secretary, he was in those days the only person employed in the office. [Laughter.] He was then Secretary for thirty years; and, on retiring, the Directors thought they could not do better than place him on the Board. His services had been of great value to the Company.

The retiring Auditor (Mr. J. C. Benwell) was also reappointed.

MUNICIPALITIES AND PUBLIC LIGHTING.

Mr. C. E. BOTLEY, in moving a vote of thanks to the Chairman and Directors, said such an acknowledgment from the proprietors was well deserved. The report and the balance-sheet showed prosperity in every part. Although at the present time gas undertakings were under a cloud in respect of the coal difficulties, which were causing much anxiety (in which, through his connection with a gas undertaking, he had to share), the Directors and officers were doing all they possibly could to meet the situation; and he was sure they would get through without much damage. The price of coal had gone up so much of late years that, had it not been for the efforts made in the manufacturing department to increase the efficiency of the carbonization, he did not know where gas undertakings would now have been. Within his own knowledge in the past 25 years, there had been an increase in the make of nearly 40 per cent. The Croydon Company had shown a wonderful example in this matter. He had been interested in hearing the remarks of one of the proprietors on street lighting. His (Mr. Botley's) own experience was this, that, where a corporation owned an electricity undertaking, and there was a gas company in the district, it did not matter what they offered to do the street lighting for—even if they offered to do it for nothing—the corporation would not accept it. It was said that they had to find something with which to feed the municipal baby; and the question as to what it cost the ratepayers had not the slightest consideration. This was unfortunately the case. Where they had a municipal undertaking owning both the gas and electricity undertakings, then the two committees quarrelled; and often it was found the gas department had to pay the losses on the electricity department. Therefore they need not be surprised if in Croydon they did not retain all the street lighting.

The motion, having been seconded, was cordially passed.

INDISPOSITION OF MR. HELPS.

The CHAIRMAN having acknowledged the vote on behalf of himself and his colleagues, moved a vote of thanks to the officers, staff, and workmen for their efficient services. He considered that they had the best set of officers in the kingdom. He was sorry to say their Engineer and General Manager (Mr. James W. Helps) was absent from his place that day. Unfortunately, he had had a breakdown in health, and had gone away for a change and rest, and special treatment for his nerves. They hoped that it would not be long before he was with them again. He certainly wrote more cheerfully now than he did; and the doctor had buoyed him up with the hope that he would shortly be in a better state of health. Therefore, they trusted to see him back again before very long. In Mr. Caddick, during Mr. Helps' absence, they had had a splendid officer. He had had a lot of worry, as other managers had had, during the past month or six weeks, on account of the short supply of coal, and also from the severe test they had during the sharp snap recently experienced. Mr. Caddick stuck to it manfully, and pulled them through; and they had no trouble on that account. In Mr. Topley, a better Secretary no company ever had; and he had hearty assistance from Mr. Anderson and Mr. Haines. In the distribution department, they had had a wonderful increase, and this was due to the energy and perseverance of their Distribution Superintendent (Mr. Sandeman). With the whole of their men they were on splendid terms—thanks largely to the co-partnership scheme.

Mr. SAMUEL SPENCER seconded the motion, which was carried.

It was unanimously agreed, on the motion of the CHAIRMAN, seconded by Mr. BOTLEY, to send Mr. Helps a telegram wishing him a speedy recovery and return to health.

Mr. TOPLEY asked to be allowed, in the name of the whole of his staff and the employees, to associate himself and them with the keen regret felt at the cause of absence from among them of Mr. Helps, and to add with what great pleasure they learned that he appeared to make steady progress towards recovery. He (Mr. Topley) had a letter from him two days previously, in which, after referring to his great regret at his inability to be present, he used the words that he was "feeling a little better." This, he (Mr. Topley) thought meant much. He also asked him to express at this meeting his sense of the extreme kindness with which, now and in the past, he had been treated by the Directors on such occasions as this. It was only what one might expect to hear had been the treatment accorded by the Directors to every one of the officers. In mentioning this matter, he was conveying to the proprietors the express message with which Mr. Helps had charged him. In acknowledging the vote on behalf of himself and staff, Mr. Topley stated that of the 1860 warrants that were going to be posted on this occasion, he found that something like 340 would, under the co-partnership scheme, carry a share of the profits to the employees.

Mr. CADDICK, acknowledging the vote on behalf of the engineering staff and the workmen, observed that the proprietors had heard from the Chairman an account of the extreme demand that had taken place for gas during the cold weather; and he, and all those who worked with him he knew, appreciated the kind remarks made in reference to this matter. While referring to the work at Waddon, there was one matter he should like to particularly mention. As the proprietors were aware, the Directors had reduced the price of gas several times of late years, and the dividends had been increased. But the Board had gone farther than that by, without a single application from the employees, increasing the wages of the workmen by a very satisfactory amount. This increase to the men meant something like £1500 a year. He was sure the workmen would desire him to extend to the Directors their hearty thanks for the liberal manner in which they had been treated.

BOURNEMOUTH GAS AND WATER COMPANY.

Further Increases—Labour and Coal.

The Half-Yearly General Meeting of the Company was held last Friday, at the London Offices, No. 90, Cannon Street, E.C.—Mr. G. CRISPE WHITELEY in the chair.

The SECRETARY (Mr. H. A. Plumb, F.C.A.) read the notice convening the meeting; and the Directors' report and accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the history of the Company during the six months with which they had to deal was very simple and eminently satisfactory. The accounts the Directors had to lay before the proprietors spoke for themselves, and showed an amount of business done, and an amount of profit earned, which ought to, and which would, satisfy the most exacting proprietor. The particular points of the last six months might be summed up by saying that the summer quarter was the driest they had ever had, and the winter quarter was one of the mildest. With reference to the first, they might congratulate themselves, and they did do so, upon having risen to the occasion. The manner in which they had poured into Bournemouth during this very trying period an ample supply of pure and wholesome water—water which had been submitted to the most severe analysis—was really a triumph. It received the encomiums of the local Press—praise which, he need not say, the Directors and officers greatly appreciated. As to the mildness of the winter quarter, notwithstanding this they had had most gratifying increases—a continued development they were now accustomed to; and, taking the whole of the half year, they had received more money in spite of the fact that, compared with the corresponding half of the previous year, the price of gas had been lowered. They heard a good deal outside about labour troubles. He was thankful to say they knew nothing about them at Bournemouth. The staff and the men were able and intelligent; they were zealous and loyal; they were happy and contented. Long might it be so. It was unnecessary to say that the Board had endeavoured to deal, and he thought they had succeeded in dealing, generously with everybody. They raised salaries and increased wages before they were asked to do so; and they did not wait if they considered there was just and right cause for taking such action. The result was, he ventured to say, they had as happy and satisfactory a connection between employers and employed as possibly could be desired. There was, of course, trouble looming in the future. He referred to the question of coal. He could not give any latest information that morning with regard to the present state of affairs. All he could say was that the Board had taken, were taking, and would take every precaution that they could to provide for any contingency. Whether or not they would do so successfully, was in the bosom of the future; and there it must be left. In a few minutes he was going to ask the proprietors to give the Board authority for calling up further capital. Even succeeding as they did in their present water supply, they must prepare for the future. With regard to the increase in the gas business, too, they had to enlarge their works, and be ready for fresh business. Of course, the powers the proprietors conferred on the Board would only be used as required. Inasmuch as they had every hope of giving a good return for any money they might receive, they did not anticipate any great difficulty in getting the amount for which they would ask.

Mr. R. HESKETH JONES seconded the motion, and endorsed all the Chairman had said with reference to the relationships with the men, which were extremely satisfactory.

The motion was unanimously carried.

The CHAIRMAN moved the declaration, less income-tax, of dividends for the half year at the rate of 15 per cent. on the original shares, 7 per cent. on the "B" ordinary shares, and 6 per cent. on the preference shares.

Mr. W. CASH, in seconding, said the dividend was a satisfactory one. It had been well and truly earned; and, after paying it, there was a surplus on the half-year's working.

The CHAIRMAN proposed the re-election of Mr. R. Hesketh Jones as a Director. He remarked that Mr. Jones had lived a long life in connection with the gas industry, and had gained an amount of knowledge and experience of which the Company were fortunate in having the use. He was sure the proprietors joined with him (the Chairman) in hoping

that they might still have many more years of service at the hands of Mr. Jones.

Mr. CASH, in seconding, also spoke of the high value the members of the Board placed on the services of their colleague.

The motion was unanimously agreed to.

Mr. JONES cordially thanked the proprietors for re-electing him, and the Chairman and Mr. Cash for their kind remarks.

Mr. R. H. GLEN moved, and Mr. HARRY WOOD seconded, the re-appointment of the retiring Auditor (Mr. F. G. Barrett); and this was carried.

Mr. A. W. OKE moved a vote of thanks to the Chairman and Directors. Having referred to the excellent state of the balance-sheet, he remarked that the Chairman had alluded to the phenomenal state of the weather during the past six months, and how the Company had given every satisfaction to the consumers. He (Mr. Oke) noticed, in this connection, there was an item in the accounts for water filtration and softening. With this, in addition to the excellent natural supply of water, those who lived in the well-favoured district of Bournemouth enjoyed an extra privilege. To have well water softened and filtered was no doubt almost a luxury at the present time. It was likewise pleasant news to the proprietors that, with all the labour troubles on every side, the Company enjoyed the hearty co-operation of all their employees, who had worked so admirably. He thought this was due in no small measure to the co-partnership system.

Mr. J. C. BENWELL seconded the motion, which was carried.

The CHAIRMAN thanked the proprietors for this kindly recognition of the services of the Board. It was very pleasant for the members working together in the manner they did. Although they had anxious times, still they had the gratification of feeling that they were admirably supported by the staff. There was one absentee from the Board to whom he should like to make allusion. Mr. Corbet Woodall unfortunately was not well enough to be with them that day. He had, however, sent them through the telephone a cordial greeting, saying how much he regretted he was not quite strong enough to be with them that morning. At the same time, they must rejoice that he was much better, and hoped very shortly to resume the full and active life that he had been carrying on for so many years in the profession which he adorned. Perhaps the proprietors would give him (the Chairman) authority to send to Mr. Woodall, on their behalf and that of the Board and officials, their sympathy and expression of hope that he would soon be thoroughly re-established in health. [There was cordial approval.] Before concluding his remarks, the Chairman moved a hearty vote of thanks to the officers, staff, and the workmen at Bournemouth and in London. He observed that, without the able support of their friend Mr. Harold Woodall down to the humblest worker, they could not produce such a state of affairs as they had done.

Mr. BARRETT seconded the motion, which was cordially adopted.

Mr. HAROLD W. WOODALL, in reply, on behalf of himself and those who worked with him at Bournemouth, acknowledged the vote, and at the same time the kindly and liberal way in which the Board treated all in their employ. The idea of the Directors was rather to pay the maximum they could afford than to extort services for the minimum at which they could get them. This, he knew, was fully recognized by the men; and he was glad to say that, during all the present time of trouble in the labour world, not one word of dissatisfaction had come to his notice. The Chairman had made a remark with regard to coal. He (Mr. Woodall) might venture to say that if there was such an unfortunate national calamity as a coal strike, the proprietors could rest assured that the Company had such stocks of coal that at any rate they could keep going for a period which, if the strike continued so long, would mean disaster to the country. The Company had ample stocks indeed for any ordinary misfortune.

Mr. PLUMB also responded.

Authorization to Raise Additional Capital.

An Extraordinary General Meeting was then held for the purpose of authorizing the Directors to issue such a number of ordinary or "B" 7 per cent. shares of £10 each as would, with the premiums thereon, produce £16,900, inclusive of a balance of 800 shares authorized on Feb. 23, 1906, but not yet issued; also £10,000 of debenture stock carrying a fixed dividend not exceeding 4 per cent. per annum.

The CHAIRMAN moved, and Mr. CASH seconded, resolutions according the necessary powers.

Mr. CASH remarked, with regard to the issue of the shares and stock for which the Board now asked authority, they would, of course, only raise it as required. The rate at which the Company's business was expanding made it necessary that they should have these additional powers. He saw that in 1906 the consumption of gas was 600 million cubic feet; while last year, it was, as near as possible, 800 millions. This was an increase of 33 per cent. in five years. Of course, they could not have their business growing at this rate without spending capital; and it would be necessary, in the near future, to consider further expenditure in extending the gas-works. There was also an allusion in the report to the question of augmenting the water supply. This was not a pressing necessity; but the Board would have to take it into consideration before long.

The resolutions were unanimously passed.

NEWCASTLE AND GATESHEAD GAS COMPANY.

The Annual Meeting of the Company was held last Tuesday, at the Offices, Grainger Street West, Newcastle-upon-Tyne—Sir W. H. STEPHENSON presiding.

The CHAIRMAN, in moving the adoption of the report and accounts, said that the revenue for the twelve months to Dec. 31, from all sources, amounted to £458,527, which, compared with the previous year's revenue of £444,657, was an increase of £13,870. The expenditure totalled up to £350,563, and, compared with the previous year, showed an increase of £22,045; but this included a special item of £15,000, and was only an apparent increase. There was a gross profit for the year of £107,965; and the amount brought forward from the previous year (£5917) made for disposal £113,882. Out of this had been paid: Interest on debenture stock and other loans, £21,757; and interim dividend in August, £41,293—leaving the amount to be dealt with, £50,832. The Directors recommended the payment of the final dividends on the ordinary and preference stocks, which accounted for £41,293, and left a balance to be carried forward of £9539, which, compared with the previous year, showed an increase of £3622. The chief items of revenue were: Gas, £286,449; rentals of meters, stoves, &c., £39,187; residual products, £131,091—the total being £458,527. On the debit side, the chief items were: Coal and oil, £150,021; other manufacturing charges, £87,593; reconstruction of carbonizing plant at Elswick, £15,000; distribution of gas, £48,386; and rents, rates, and taxes, £23,175. These, with other smaller items, brought the total to £350,542. The amount for rates, he was sorry to say, showed an upward tendency. The increased yield from gas had been £5090. The quantity of gas sold during the year was 3,054,620,000 cubic feet; being 56,133,000 cubic feet, or 1·87 per cent., more than in 1910. This was a larger amount than in any previous year. The last previous record year was 1907, when 3,028,000,000 cubic feet were sold. The increase from residuals in 1910 over 1909 was £13,095. This had in 1911 been more than maintained; for the increase over 1910 was £7916. The yield from coke was adversely affected by the fact that the make of oil gas was increased, in order to economize the use of coal, in view of the possible strike of miners. The coke market was not quite so good in the early as in the latter months of the year. It had further improved since the beginning of this year. The increase from tar was £8661. The better prices of 1910 had been improved upon during 1911, and appeared to be likely to improve still more in the future. Sulphate of ammonia manufactured had yielded the largest increase from residuals—£4347. Notwithstanding the greatly increased quantity produced in the United Kingdom, sulphate was growing in value. Coals cost £150,021, at practically the same price per ton as in 1910; but 3349 tons more were carbonized. It was not his purpose to cast the horoscope and endeavour to foretell future events. They were doing the best they could for the present. The Directors had, after mature consideration, decided to reconstruct the carbonizing plant at Elswick, with the object of reducing the present cost of working. Exhaustive investigation had been made by the Chief Engineer (Mr. T. Hardie) and a Committee of the Board before coming to a conclusion as to the system most suitable for carbonizing the coal generally available to the Company, with the result that a 2½ million cubic feet per day plant on the Glover-West system of vertical retorts had been ordered. The work of demolishing one half of the old plant had been commenced; and the contractors for the new plant had guaranteed its completion by Dec. 1 next, in time to take up the heaviest of the winter consumption. In the meantime, the necessary carbonization would be performed at the up-to-date works at Redheugh. In the new system, practically the whole of the carbonizing and the handling of coal and coke would be done mechanically. The second half of the reconstruction would follow as soon as it was required. The sum of £15,000 had been debited in revenue account for last year towards the cost of the alterations. It was confidently expected, however, that the saving in the cost of working would abundantly justify the expenditure. The Directors had announced a reduction of 1d. per 1000 cubic feet in the price of gas, as from the commencement of the present quarter; and they trusted their action in this respect would be fully justified by a substantial increase in the sales. The price within the city of Newcastle, the borough of Gateshead, and certain outlying districts, after deducting the liberal discounts allowed for prompt payment, ranged from 1s. 10½d. to 1s. 6¾d. per 1000 cubic feet, according to quantity consumed; all gas-engine consumption being charged at the latter figure. The increased dividend for the shareholders under the sliding-scale would be 2s. 6d. per cent. To encourage the use of stoves for cooking, a reduction of about 10 per cent. would be made in the rental as from April 1. The use of gas under high pressure was extending generally throughout the kingdom; and the Company were not behind the times—a commencement having been made with a system of high-pressure mains which would be extended to meet the demands. During the past year, the conditions of employment of practically the whole of the Company's workmen had been under review. They had, with their representatives, been met by the management, when matters were fully discussed in an amicable manner, as such things should be; and, where it was found to be necessary, alterations were made. As to the future, much would depend upon peace being maintained in the industries of the district; and they all sincerely trusted it would. With this reservation, he looked forward with confidence to a continuance of the growth of the Company's business, which had been conspicuous during the past year.

Sir WALTER PLUMMER seconded the adoption of the report; and the resolution was carried unanimously.

Dividends were declared for the half year at the rate of 4 per cent. per annum on the preference stock, and 4⅜ per cent. per annum on the ordinary stock; and the Chairman was thanked for presiding.

DERBY GAS COMPANY.

The Ninety-Second General Meeting of the Derby Gas Company was held last Friday—under the presidency of Col. G. GASCOYNE.

The CHAIRMAN, in moving the adoption of the report and accounts for the twelve months ending Dec. 31, said the Directors had once more the pleasure of congratulating the stockholders upon a very successful year's trading. The early part of the report pointed out the fact that there was a considerable increase in the volume of business. To begin with, something like 10 miles of additional mains had been laid down. The parishes of Hilton on the west, and Aston on the south, had been supplied with gas; and the inhabitants of these districts were gradually availing themselves of the supply, both for lighting and heating purposes. Great additions and improvements had also been made in other localities; and all this, of course, gave the opportunity to supply new meters, engines, stoves, and fittings. The result of the policy of continuous progress on the part of the Company was that there had been a larger consumption of gas than in any

previous year. The increase of production in 1911 over 1910 amounted to 47 million cubic feet. It might be interesting to the shareholders to know that the consumers had increased by nearly 1500; and they now numbered altogether 30,500. The Company had supplied and fixed during the past year more than 2000 additional cooking stoves and fires. The long spell of hot weather during last summer and autumn created such an exceptionally heavy demand for these appliances, that at times their resources were overpowered. It would be remembered that a few years ago the Company purchased two small gas-works, one at Duffield and the other at Spondon, with a view to closing down and dismantling them, and supplying these districts from the large works at Derby. This scheme had now been carried out. The land and available buildings at both these works had been sold, and the purchase-money credited to capital; and after the adjustment due to the loss on dismantling the works had been dealt with through the profit and loss account, there remained in the capital account a balance of £14,360 of unexpended capital. This should carry them on for some little time without having to call up any further capital. The amount paid for coal (£42,603) was a little less than last year; but it would be risky to prophesy what would be the cost this year. The Company held a stronger position than ever before, and prospects were undoubtedly good; but there were clouds which hung heavily overhead. Strikes and troubles in many branches of industry had caused serious injury to the trade of the country; and threats of strikes exerted a disturbing influence almost as prejudicial to the best interests of the community as the strikes themselves. Whether they looked at the coal trade, the textile fabric industry, or the railways and docks, the question of labour unrest could not fail to cause some uneasiness in the minds of those whose duty it was to control large business concerns. It was earnestly to be hoped that wise counsels might prevail, and that a satisfactory basis of permanent agreement would be arrived at throughout the country. There was every indication that they would have to pay a higher price when renewing their contracts. The Board always retained large reserves of coal—sufficient, they believed, to meet any ordinary emergency—and even if such a calamity as a general stoppage of work at the collieries should occur, they hoped to be able to give an uninterrupted supply of gas during the time any such stoppage might be likely to last. He was glad to have the assurance of their capable Engineer (Mr. J. Ferguson Bell) that the relations with all the employees continued to be of a most harmonious and friendly character. A few months ago, the Board spontaneously made advances in the scale of pay to the men; and he had reason to believe that this action was fully appreciated. The total expenditure for the year was £98,868, which was an excess of £5872 over last year. But against this they had to set the fact that they had done more business, and therefore the expense must be greater. On the other side of the accounts, the sale of gas, including meters and fittings, amounted to £108,155—an increase of £3617, due to increased consumption. In his remarks at the last general meeting, he referred to their project to lay down high-pressure mains in the centre of the town, to enable large shopkeepers to avail themselves of the latest type of gas lighting. It was pleasing to note that this enterprise had met with great success. Residual products had realized £38,452—an increase of £4682. These, with the satisfactory sum of £826 for the earnings of railway waggons, and a few trifling items, made a total of £147,468. The balance of revenue account carried to profit and loss was £2521 more. The most salient feature was the announcement that the Directors were prepared to recommend the payment of an additional ¼ per cent. above the rate paid last year. This was a tribute to the success of the policy of progress and modernization which had been vigorously pursued for the last few years. This policy had had the effect of giving power to the Directors to reduce the charge for gas a year ago to every one of the 30,500 consumers by 2d. per 1000 cubic feet, and so, by this reduction, to arrive at the point at which, under the sliding-scale, their statutory provisions authorized them to increase the dividend payable to the stockholders by ¼ per cent. These results had only been obtained by the constant care and attention of those who had been engaged in the undertaking; and the Directors, the Engineer, the Secretary, all the members of their respective staffs, and the employees, had heartily co-operated in the work.

The report was adopted; and the standard rate of dividend on the consolidated stock, at the rate of 5 per cent. per annum, for the half year ended Dec. 31, with an additional ¾ per cent. for the whole year, making 5¾ per cent., was declared. The Directors and officers were thanked for their services; and the Chairman and Mr. Bell replied. The latter gentleman remarked that it must be very gratifying that their employees displayed such attachment and loyalty to the Company in these days of unrest.

PORTSEA ISLAND GASLIGHT COMPANY.

The Chairman (Mr. R. Edgcombe Hellyer) presided over an average attendance of proprietors, at the half-yearly meeting of the Company, which was held in the Board-room, at the Company's Offices, last Saturday. In moving the adoption of the report and accounts, he stated that the number of consumers had increased by 1720, and that the total was now 45,674. Also that cookers, fires, and other appliances were being used in the district to a greater extent than at any previous period; and that, though the quantity of gas sold was less than for the corresponding period of last year, this was wholly attributable to the abnormal climatic conditions—the Company's experience in this respect coinciding with the experience of the largest London Companies. But notwithstanding the diminished quantity sold in the last six months, the total for the year was 1½ per cent. greater than for 1910. Dealing with the financial results, he pointed out that the half-year's expenditure, exclusive of extraordinary renewals, showed a decrease of £3678; while the receipts were reduced by £2064 only—a net increased profit for the six months of £1762.

The motion was carried unanimously; and dividends at the usual rates were declared. The retiring Directors (Mr. F. M. Aylen and Colonel C. Lanyon Owen) were re-elected, as was also Mr. Howard B. Morris, one of the Auditors. A grant of £50 to the Portsmouth, Portsea, and Gosport Hospital was authorized; and the meeting terminated with the usually complimentary vote to the Chairman and Directors, the Engineer and General Manager (Mr. J. D. Ashworth), the Secretary (Mr. H. A. Stibbs), and the staff generally, for their conduct of the Company's affairs.

At the termination of the ordinary business, a special general meeting was held for the consideration of the Joint Parliamentary Bill, in which the Company are co-operating, to provide for the adoption of the "Metropolitan" argand burner No. 2 as the test-burner, in substitution for the one now in use. The clauses of the Bill were read by the Secretary, and afterwards explained by the Chairman, and unanimously approved.

SCARBOROUGH GAS COMPANY.

Interesting Comparisons of Gas Consumption and Prices.

The Annual General Meeting of the Scarborough Gas Company was held on the 10th inst.—Mr. W. S. ROWNTREE in the chair.

The MANAGER AND SECRETARY (Mr. Alexander Allan) having read the notice convening the meeting, the report and accounts for the past year were presented. In the former, the Directors expressed their pleasure in stating that the Company's business continued to make satisfactory progress; the sale of gas showing an increase of nearly 9½ million cubic feet compared with the previous twelve months. The accounts showed a balance of £9558 available for distribution; and the Directors recommended the payment of the usual dividends on the ordinary stocks at the rate of 5 per cent. per annum. This would leave £2970 to be carried forward.

The CHAIRMAN, in moving the adoption of the report, referred to the satisfactory increase in the sale of gas, which he said was of as great importance to the consumers as to the shareholders; for while the dividends could not be increased, the benefits derived by the Company through the augmented consumption ultimately found their way to the consumers in the form of cheaper gas. Every class of consumer (with the exception of the public lighting, which showed a decrease of over 500,000 cubic feet during the year) had contributed to the additional consumption; the prepayment class accounting for nearly 6 million cubic feet. Referring to the accounts, the Chairman said the past year was a record one in connection with the residuals market, owing to the greatly increased prices ruling for tar and sulphate of ammonia. The result of the year's working was a balance of £9558, which would allow of the payment of the usual dividends and leave £2970 to be carried forward. With regard to the public lighting, the Directors regretted that, notwithstanding their desire to maintain its efficiency, it had been much impaired during the year by reason of smaller burners being put into about two-thirds of the lamps. Not only on this account had the lighting been depreciated, but a large number of the lamps had been fitted with inverted burners, which were not so efficient for street lighting as existing vertical burners consuming at the rate of 5 cubic feet of gas per hour. These remarks were not applicable to the inverted burner for street lighting purposes when working under the high-pressure system. Having alluded to the efforts made by the Directors to assist consumers in getting the best possible results from the use of gas for lighting, heating, and cooking, the Chairman turned to the subject of the price of gas. He said when he joined the Board in 1885, the sale of gas was only 138 million cubic feet; whereas last year it was 327 millions. At the earlier time, the price of gas to ordinary consumers was 3s. 3d. per 1000 cubic feet, compared with 2s. 2d. now—a reduction of a third; and the price for public lighting was 3s. 3d., against the present charge of 1s. 9d., or a reduction of nearly one-half. In 1885 there were no monthly consumers, prepayment meters were unheard of, and the gas-cooker business was in its infancy; whereas now there were 1357 monthly consumers, 4480 prepayment consumers, and nearly 4000 cookers out on hire. Though the price of gas had been reduced 33·3 per cent. since 1885, the charge at that time was low compared with what it was fifty years ago—viz., 5s. 10d. per 1000 cubic feet. In conclusion, the Chairman remarked that, notwithstanding the depreciation of all gilt-edged securities, the shareholders would be pleased to learn that the market value of the Company's ordinary stock had during the past year reached the highest figure since 1901.

Mr. R. H. BUTTERWORTH seconded the motion; and it was carried.

The dividends were then declared, and the retiring Directors and Auditor re-elected.

Responding to a vote of thanks to the Directors, the CHAIRMAN said a large part of the satisfactory work of the Company was due to the Engineer (Mr. Allan); and he moved a vote of thanks to him and to the officials and staff for their attention to the Company's interests.

Mr. ALLAN, in reply, said the vote was appreciated by the staff, as it showed that at the end of another year the work done had given satisfaction and met with approval.

Walsall's Unfortunate Electricity Undertaking.—At a meeting of the Walsall Town Council on Monday of last week, Mr. Hayward presented the annual report of the Electricity Committee, which showed a loss on the year's working of £184. He said the unfortunate result was due to the Committee having had to scrap thousands of pounds worth of machinery to instal more up-to-date plant. The deficiency was entirely owing to abnormal expenditure amounting to a total of £1950; and the loss was not unexpected. As regarded the future, the outlook was much brighter, as the cost of generating current would be greatly lessened by the new plant. Mr. Slater, in seconding, said the Committee were now in a more favourable position, as, while the cost of production had been cut down, the revenue was steadily increasing. Alderman Pearman Smith said that, seeing the capital invested in the electricity undertaking amounted to £118,000, some special effort ought to be made to place it in a sounder financial position. No private concern could have stood the losses this undertaking had sustained since its inception. The report was approved.

WANDSWORTH AND PUTNEY GAS COMPANY.

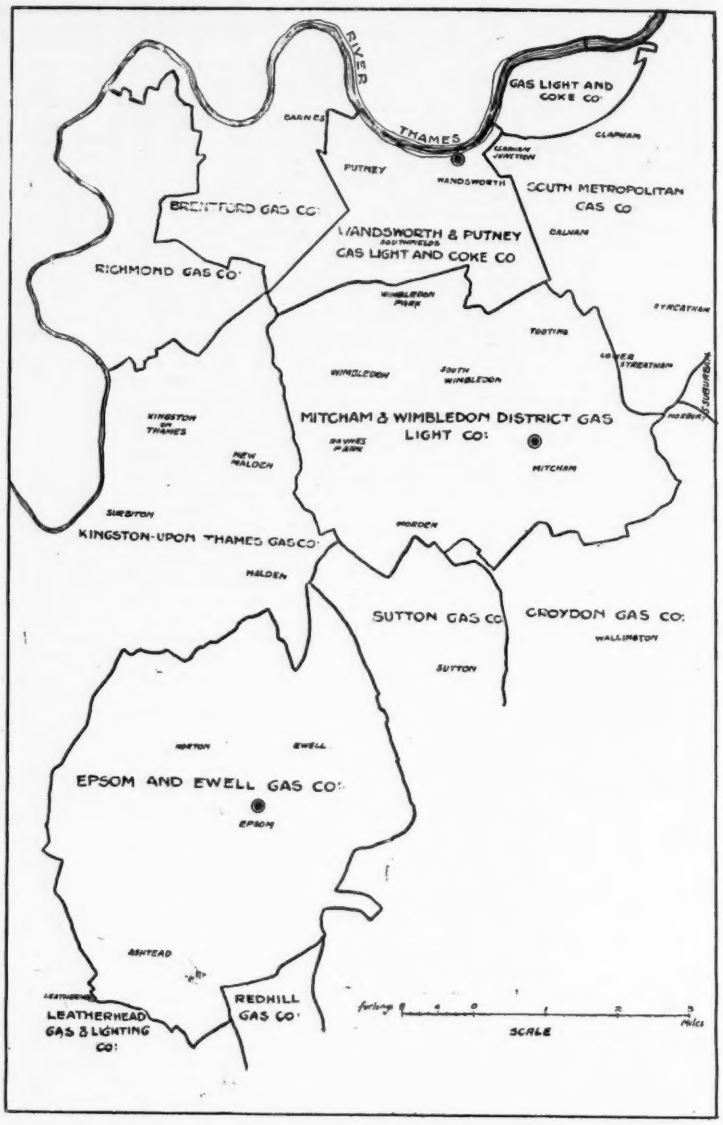
Proposed Amalgamations—Report and Accounts.

The Half-Yearly General Meeting of the Wandsworth and Putney Gas Company which takes place to-day will be of more than usual interest from the fact that the proprietors will be asked to sanction the important scheme of amalgamation, for the carrying out of which, as already recorded in the "JOURNAL," the Company are now seeking parliamentary powers. The nature of the scheme was indicated in the epitome of the Company's Bill given in a recent issue [*ante*, p. 209]; and from the accompanying map an idea may be formed of the extent of the area affected. The projected concentration of gas-supplying power south of the Thames—both east and west—which will shortly engage the attention of Parliament will be an outstanding feature of the gas legislation of the session.

Before the proprietors are asked to consider the proposals of the Directors in regard to the matter just referred to, they will have submitted to them the report and accounts for the six months ended the 31st of December. These show that the revenue from the sale of gas to ordinary consumers, at the very low figure of 1s. 9d. per 1000 cubic feet, was £47,164; for public lighting £3488 was received; meter and stove rentals, &c., came to £11,834; residuals produced £25,532; and the total receipts were £88,524. Manufacture of gas cost £50,578; distribution, £12,899; management, £3498; and other items (including £1200 for profit-sharing) made up a total of £73,129—leaving £15,395 to go to the profit and loss account. After providing for the interest on debenture stock and on deposits and loans, there remained to the credit of the net revenue account, with the addition of the balance brought forward, a sum of £26,613 available for distribution. The Directors therefore recommend the declaration of dividends at the statutory rates per cent. per annum of £8 7s. 6d. and £6 17s. 6d. on the "A" and "B" consolidated stocks, and of £5 17s. 3d. on the ordinary "C" stock.

The statements relating to working show that, under the supervision of the Company's Engineer (Mr. H. O. Carr), 41,200 tons of coal and 314,900 gallons of oil were used in the second half of last year in the production of 606,572,000 cubic feet of gas, of which 568,176,000 cubic feet were sold and 576,122,000 cubic feet were accounted for. The estimated quantities of residuals made were: Coke, 25,750 tons; breeze, 3840 tons; and tar, 498,108 gallons. From the ammoniacal liquor, 350 tons of sulphate of ammonia were produced.

In the report of the Directors of the Mitcham and Wimbledon Gas Company which will be presented at the half-yearly general meeting next Tuesday, it is stated that the Bill for the amalgamation of the Company with the Wandsworth and Putney Company and the Epsom and Ewell Company, which received the approval of the proprietors at a special general meeting on the 16th ult., has passed successfully through the preliminary stages, and will in due course be submitted to Parliament.



REPAIRERS IN GAS-WORKS UNDER THE INSURANCE ACT.

An Interesting Point.

A short time ago, a question arose as to how the men engaged in gas-works during the repairing season are to be treated under the Insurance Act, as at such times a man may be engaged for one hour in assisting another to move bricks or pieces of machinery, and the next be at work in the coke yard. Time-keeping under such conditions would be by no means easy. The point appeared to be of such importance, that a legal gentleman in the House addressed a letter on the subject to the President of the Board of Trade, and received the following response.

In reply to your letter, raising certain points in connection with Part II. of the National Insurance Act, I may state that (1) the manufacture of gas by a company is not in itself an insured trade within the meaning of the sixth schedule of the Act. (2) Workmen engaged in building and engineering operations, even though they are employed by a gas company, must be insured, by reason of section 107 (2), which provides that, in determining whether a workman is insurable or not, regard is to be paid to the nature of the work in which he is engaged rather than to the business carried on by his employer. (3) Section 104 does not provide for making special orders to exclude such workmen as those mentioned by you—viz., workmen doing insurable work for an employer whose main business is not insurable. Such workmen are insured, and cannot be excluded.

I may add that, while the above represents the views of the Board of Trade, the authoritative determination of any question whether or not a particular class of workmen are following an insured trade rests not with the Department but with the Empire.

We have received from Messrs. Ruscoe and Co., Limited, of Queen Anne's Chambers, S.W., a pamphlet on "The Automaton Automatic Lighting." It contains particulars of the gas-pressure system of actuating the mechanism controlling public lighting, illustrations of part of the appliance employed and its position in the lamp, and views of installations.

POSITION AND PROSPECTS OF COALITE.

Under the heading "Chat on 'Change" in the "Daily Mail" last Friday, the following remarks were made:—

Little has been heard of coalite since, amid an obviously unsatisfactory state of affairs, the Directors were making glowing promises upon the fulfilment of which we had to cast doubt. Now, however, it is clear that matters have become much worse. A Syndicate called the Eticoal Syndicate, which has entered into an agreement with the two Coalite Companies and the Investment Registry, is endeavouring to raise a little more money, which, to use the words of the appeal for subscriptions, is "to meet the pressing financial difficulties which stand in the way of establishing the commercial value of the process."

In the circumstances, the terms which the new Syndicate has arranged with the British Coalite Company, which is described as being at the end of its resources, are naturally onerous. The debenture-holders are to hold off until the middle of this year at least; the Syndicate is to have free use of the Barking premises and plant until Jan. 1, 1913; it is to have an option to purchase these premises for £85,000, and to use the Company's process in consideration of half of any profits; or it may take over the greater portion of the assets subject to the liabilities for half of any profits it may make; and the British Coalite Company is to repay the sums expended by the Syndicate, with 6 per cent. interest.

It is now declared by the Syndicate, on the Board of which the British Coalite Company is represented, that the methods hitherto adopted and the plant have been in many respects unsuitable and ineffective. The sum which it is at present sought to raise is £15,000, of which £9000 has been underwritten for a consideration which includes one-tenth of the foreign and colonial patents owned by Coalite, Limited. It is proposed to use the funds in the erection of fire-clay batteries, in the anticipation, which is claimed to be justified by recent results, that the business can be proved to be profitable in about six months, when the Company can be reorganized. It is difficult to imagine Coalite shareholders parting with more money.

The "Financial Times" on Saturday contained the circular which has been sent to the shareholders of the British Coalite Company, Limited, by the Secretary, informing them that "the financial position

of the Company is unfortunately so critical that an entirely fresh departure is necessary if the assets are to be preserved and the working of the coalite patents is to be continued." He then states that the Eticoal Syndicate, Limited, has been formed with a capital of £30,000, for the purpose of rendering the necessary financial assistance; and he encloses a memorandum (also given in our financial contemporary) setting forth the terms on which the Syndicate has underwritten a portion of its capital, and the options in consideration of which it has agreed to afford the assistance. The shares are £1 each, and the first issue is 15,000. One of the Directors is Mr. Herman Clarke, the Managing-Director of the British Coalite Company, Limited.

STAINFORTH GAS SUPPLY.

Objection to the Hatfield Provisional Order.

Stainforth, a little place about seven miles from Doncaster, having a great future before it as a colliery centre, is greatly concerned over its gas supply. A largely attended meeting was recently held in the Council School, to protest against the mode of procedure adopted by the Hatfield Gas Company, Limited, to obtain a Provisional Order to supply the parish with gas. The question first arose at the meeting of the Thorne District Council in November last, when the Company applied for permission to cross the road near the Stainforth Railway Station. The Company subsequently applied to the Board of Trade for a Provisional Order. The representatives of Stainforth on the Thorne Rural District Council strongly opposed it; and as the matter came up at the next Parish Council meeting, a Doncaster solicitor was employed to look after the parochial rights. At the recent protest meeting, Mr. Houlton, who presided, said the whole parish had been canvassed, and the residents were distinctly told that the petition which had been got up had nothing whatever to do with the Company, but was simply to ascertain who was in favour of being supplied with gas. Mr. Dyson, the Clerk to the Parish Council, read a copy of the letter which the Solicitor had sent to the Board of Trade, in which upwards of a dozen objections to the scheme were raised. Mr. Smith said the old plant at Hatfield was worn out, and the present price of gas was 5s. 2d. per 1000 cubic feet, whereas the Manager of the new colliery (Mr. Berry) was prepared to guarantee a supply to the village at half the figure named. In the event of the Provisional Order being obtained by the Gas Company, the Colliery Company would certainly not consume the Hatfield gas, but would erect plant of their own. The meeting unanimously passed a resolution to the effect that it strongly objected to the manner in which the Gas Company were endeavouring to obtain a Provisional Order to supply the parish. Speaking upon the subject at a dinner recently held in connection with the Stainforth Show, Mr. George Dunstan, a member of the Thorne District Council, said the owners of property in Stainforth had asked for a supply of gas; and this was why the Hatfield Gas Company were moving. If the Provisional Order was granted, new gas-works would be erected on a suitable site; and it was much more likely that a company already serving a district would be able to supply gas cheaper than a new one. The Gas Company were looking ahead, and preparing for the colliery village which was expected to grow up in the next few years.

STREET LIGHTING AT ENFIELD.

At last week's meeting of the Enfield Urban District Council, a long report was presented by a Committee on the subject of street lighting; prices having been procured from the Enfield Gas Company and the North Metropolitan Electrical Power Company.

The Gas Company offered to light the lamps for a period of three years after the expiration of the current contract, maintain the present burners, lanterns, and fittings, paint the lanterns once a year, clean the glass once a week, and renew the mantles when necessary, for every No. 3 Kern burner for £2 10s. per annum, and for every No. 4 Kern burner for £3 0s. 8d. a year. To the tender sent in, the Secretary of the Company (Mr. C. W. Offord) added: "In view of the continual advancement being made in the devising of burners and other gas-lighting apparatus to effect higher illuminating power per cubic foot of gas used, of which your Council may not be so fully cognizant as are my Directors, I am to state that my Directors would be willing to make an arrangement under which the Council should have an equitable share in any economies and other advantages which might, during the term of the contract, be obtainable by the Company from such developments, as well as a proportional reduction in the charge for gas included in the price per lamp, having regard to any reduction in the price per 1000 cubic feet charged to the ordinary consumers. The price above offered will effect a saving in the cost of the public lighting of more than £350 per year, though the number of lighting hours will be considerably more than before; and my Directors hope that this fact, as well as the knowledge that the undertaking distributes locally over £11,000 per year in salaries and wages, that a considerable portion of the capital employed by the Company is owned by ratepayers of the parish and that consequently the dividends earned on such are also distributed locally, that the amount paid in rates by the Company is of large proportion, and, further, that they have carried out the obligations of the previous contract in a broadly liberal spirit, will secure for them the acceptance of this offer with regard to the whole of the lamps."

The Electrical Power Company submitted a tender for arc lighting, but regretted that they were unable to send in one for incandescent lighting which they could expect to receive the favourable consideration of the Council.

The Committee recommended the Council to accept the Gas Company's offer; and this was agreed to.

The Cudworth Urban District Council have applied to the Local Government Board for sanction to borrow £6700, for the purpose of erecting a gas-works.

MUNICIPAL WORKERS' WAGES.

Concessions at Stalybridge and Ashton.

The Special Committee of the Stalybridge Town Council appointed under the terms of settlement of the recent strike of municipal employees, including the gas workers, have completed their labours. The report, with certain suggested increases of wages, together with alterations of conditions of labour in the departments affected by the dispute, was before a meeting of the Town Council last week. It was decided not to make the recommendations public until the men's Union had had an opportunity of considering the proposals. The Mayor (Alderman J. Ridyard, J.P.), in moving the adoption of the report, said the Sub-Committee had given the matter very careful consideration; and the recommendations made were absolutely fair and honest to everybody in the Corporation's employ. If the agreement entered into by Mr. Jones, of the Municipal Employees' Union, and himself had been carried out in its entirety, and if no notice had been taken of the tramway men by the remainder of the workers, they would not have had the gas cut off, the town in darkness, and factories stopped. The report of the Sub-Committee was approved without discussion.

At Ashton-under-Lyne, the proposals made by the Corporation have been accepted by the local branch of the Municipal Employees' Union. There has been a re-arrangement in regard to conditions of labour, coupled with an advance in wages ranging from 1s. to 2s. per week.

At a meeting of the Rochdale Gas Committee last Wednesday, a further letter was read from the Gas-Workers' and General Labourers' Union, asking that the question of wages should be re-opened—especially as regards stokers and drivers—and stating that the men were still dissatisfied. The Committee decided that, as they had so recently considered and dealt with the wages question, they could not see their way to re-open it at present.

MUNICIPAL GAS PROFITS.

The Local Government Board Inquiry at Salford.

The Local Government Board inquiry regarding the Salford Corporation application for a Provisional Order granting powers for gas-works extensions and to amend the provisions in the Local Acts as to the allocation of gas profits will be opened in the Salford Town Hall on Thursday, by Mr. E. A. Sandford Fawcett, M.Inst.C.E., one of the Inspectors of the Board.

Mr. Edwin Parkes, Town Clerk of Eccles, writing to the Town Clerk of Salford, says that the promoters of the Parliamentary Bill cannot accept the amended offer made by Salford as to the allocation of gas profits (*ante*, pp. 312-313). "In regard to the case of Glasgow, to which you refer," writes Mr. Parkes, "I would point out that for over forty years Glasgow has been authorized by Private Act to apply the ultimate profit derived from their gas undertaking to the common good; and the right to do this was taken away from them by Parliament in 1910—the year after the decision of the Select Committee of the House of Lords upon the Salford Corporation Bill of 1909. It appears to me, therefore, that the Glasgow case affords a strong argument in favour of our Bill." In conclusion, Mr. Parkes says: "The promoters, in drafting their Bill, have, as they thought, admitted the principle that the Salford Corporation are entitled to a fair return upon the capital expended upon their gas undertaking; but they cannot consent to the return being fixed upon the aggregate capital expended. They naturally consider that the clauses inserted in their Bill, which are in effect the decision of Lord Donoughmore's Committee, provide a fair return, and are therefore only prepared to agree to a slight modification thereof in regard to an increase of the amount to be applied in relief of the Salford rates. The only grounds upon which they would even be prepared to do this would be to save unnecessary costs. The sum which you name to be applied in relief of your rates is out of the question—being nearly three times the amount allowed by Lord Donoughmore's Committee. Such an increase cannot be entertained by the promoters; and if, as you suggest, you desire to save further expense in parliamentary proceedings, it will be necessary for your Committee to reduce the sum to an amount which will approximate closely to that settled by Lord Donoughmore's Committee."

At last Thursday's meeting of the Clitheroe Town Council, the Mayor (Alderman O. T. Mitchell) stated that, when the estimates of expenditure for the coming year came before the Council, it would be advisable for them to consider whether or not any of the profits from the gas-works should be applied to the relief of the rates. Mr. T. Garnett said the gas-works existed primarily for the comfort and convenience of the inhabitants; and a policy that aimed at large profits, at the expense of the quality of the gas, did not commend itself to him. The first duty of the Corporation was to try and run the works efficiently, and to sell gas at as low a figure as possible. Mr. R. Parker expressed the opinion that the consumers were the people who should derive any benefit that accrued from the gas-works.

WESTERN VALLEYS WATER SCHEME.

The water scheme to serve the Western Valleys of Monmouthshire (which will cost over £250,000), was commenced at Cwmyog, near Abergavenny, last Wednesday, when the first sods were cut by Councillor George Jones, the Chairman of the Abertillery and District Water Board, and Mr. F. J. Matthews, the Vice-Chairman. There was a large gathering, including Mr. Baldwin Latham, the Engineer.

Presiding at a subsequent luncheon, Mr. George Jones said they were that day taking the first step in an undertaking which would become an untold blessing to inhabitants of the Western Valleys. For years

the scarcity of water in Abertillery, Abercarn, Risca, and Mynyddislwyn had been viewed with grave anxiety; and the authorities felt that a prolonged drought would bring disaster to the inhabitants. The conditions under which the people had to live in some of their districts last summer were unbearable. In 1908, a Bill was promoted by the Monmouthshire County Council to empower them to construct one large reservoir at the Grwyne Fawr, to supply the whole of the local authorities in the county. The Parliamentary Committees considered that the County Council were not the proper authority to form a Water Board; and the Bill was thrown out. It, therefore, became clear that the local authorities must be the promoters of a Bill; and towards the end of 1908 negotiations took place for the formation of the present Water Board. It was found that the particular and peculiar advantages of the Grwyne Fawr stream would be very hard to beat; and the elevation of the reservoir would now be such as to furnish a supply to the districts of Abertillery, Abercarn, Risca, and Mynyddislwyn for all time. In 1910, they asked Parliament for permission to construct one large reservoir to supply not less than 2¼ million gallons per day to the respective districts; and the reservoir would allow of the storage of 376 million gallons, or sufficient to withstand a drought of 167 days. From the reservoir, pipes were to run down the Grwyne Valley, through the new road to Cwmyoy, and thence down near Abergavenny, past Govilon, until they reached the Waenavon Mountain, where a large tunnel was to be bored through the mountain into the Western Valleys. The total length of the pipe-line would be 34 miles. The contracts had been let to Messrs. William Underwood and Brother at £261,745 16s. 11d. In conclusion, he expressed great satisfaction with the excellent manner in which Mr. Baldwin Latham had carried out his duties, and referred to the valued services of Alderman P. Wilson Raffan, M.P., Dr. Rocyn Jones, and Mr. Theo. Vachell. To the owner of all the land involved, he felt the Board could not adequately express their gratitude. Lord Glanusk had met them kindly and generously. The land for the reservoir site (250 acres) was secured at a nominal price; and the land for the road was given free of charge. The Board would not feel satisfied if they did not express their indebtedness to the Clerk (Mr. T. S. Edwards), upon whom the success of the Bill so largely depended.

The Engineer presented a silver rose-bowl to Mr. George Jones, to commemorate the occasion; and the Contractors gave a silver salver to Mr. Matthews.

SALT WATER FOR DRINKING PURPOSES.

Dr. J. C. Thresh, the Medical Officer of Health for Essex, has been carrying out some investigations which show that in certain parts of Essex and in the London basin the water used for drinking purposes contains a considerable proportion of salt, and that these districts are among the healthiest in the county. Describing his researches in the "Lancet," Dr. Thresh says: "The subject has recently assumed greater importance since it is now proposed to utilize such a saline water as a supply for a population of several thousands." People who use the water, which has a perceptible salty taste, have stated that they soon became accustomed to it and like it.

In an interview with a representative of the "Daily Mail," Dr. Thresh said: "If this water occurred in Germany, it would come over here in bottles as a table or medicinal water. It would be good for rheumatism, gout, congested liver, and bronchial catarrh. In the north-west of Essex, we have ordinary hard chalk water; in the rest of the county it is a mixture of chalk water and sea water, which comes from the coast chiefly and to a slight extent from the Thames. This water gets into the Thanet sands, and as it filters through them it loses its chalk and takes up carbonate of soda and salt. The chalk and sea water mix and form the ordinary water we find in the chalk and Thanet sands in Essex and in London. The average amount of salt contained in the water is from 40 to 50 grains a gallon. At Mersea Island and Tollesbury, from 80 to 100 grains are found. The water has been submitted to eminent physicians, who agree that it is harmless."

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Treasurer's Committee of the Edinburgh Town Council, at a meeting on Friday, agreed, on a letter from the Engineer and Manager of the Gas Commissioners (Mr. A. Masterton), to grant the use of the Waverley Market from Oct. 23 to Nov. 2 for the purpose of holding a gas exhibition by the Commissioners.

In the course of the annual report by the Directors of the Inverkeithing Gaslight Company, Limited, it is stated that arrangements had been made by the Town Council of Inverkeithing for the public street lighting being undertaken by the Company. Negotiations had also been opened with the Dunfermline District Committee for the public lighting of various districts in the neighbourhood of Inverkeithing, and the hope was expressed that the terms offered might be accepted. Owing to the great increase in the consumption of gas, and the prospects of a further substantial increase during the current year, the Directors were considering the question of increasing the size of the present gasholder, and also the purifying plant. For this and other purposes, further capital would be required. The prospects for the year ensuing were considered favourable; and, in view of these, the Directors had considered it expedient to make a further reduction of 5d. per 1000 cubic feet on the winter rate for gas used partly for cooking or partly or wholly for lighting purposes, and to reduce the price of gas used for power purposes to 4s. 7d. per 1000 cubic feet. The discount given to prepayment meter customers would be increased from 1d. to 1½d. per 1000 cubic feet until such time as the meters were so adjusted as to give an additional supply of gas. With the view of encouraging the use of gas for cooking purposes, it had been decided to make a reduction in the rent charged for the use of gas cookers and stoves.

At the meeting of the Broughty Ferry Council on Monday, the question of automatic street lighting was discussed at some length. There was some division of opinion as to whether there should be a full installation or only one of 250 lamps; the argument in favour of the latter proposal being that it was doubtful if there was the necessary pressure from the gas-works. Eventually, by six votes to five, it was agreed to adopt the full automatic wave-pressure system, and to give the contract to a British firm.

On Monday, at an extraordinary general meeting of the shareholders of the Cambuslang Gas Company, presided over by the Chairman—Mr. David Rankine—the Secretary stated that the meeting had been called with the view of authorizing the borrowing of money for the purpose of, among other things, erecting new vertical retorts at the gas-works. Mr. Rankine said that visits had been paid by the Directors to various works in the country in connection with the proposed extension. There had been a large increase in the consumption of gas in Cambuslang (already it was as high as 8 per cent. for the year), and the retort power of the works was exhausted. It was unanimously agreed to authorize the Directors to borrow the amount necessary. It was also mentioned that the Directors were well prepared for all eventualities in connection with the threatened coal strike.

The Gas Committee of the Arbroath Town Council have reported in favour of the introduction of mechanical stokers at the gas-works.

A gas explosion occurred on Friday in a house in the Blairhill district of Coatbridge, resulting in damage to property and injury to the tenant. The occupant, Mr. A. Plant, detected a strong smell of gas, and went in search of the leak with a lighted taper. He got on to the table to try the gasalier, with the result that he was blown backwards on to the floor, and was burnt about the face and hands.

At a meeting of the ratepayers of Larbert on Monday, resolutions were carried unanimously pledging opposition to the extension scheme of the Falkirk Town Council, and agreeing to take a plebiscite with regard to it.

Owing to a breakdown of the gas supply in Tayport on Sunday night, recourse had to be made to candles and oil-lamps.

The District Committee of the Middle Ward of Lanark have now intimated by circular to the residents in the Cambuslang special lighting district that they are about to enforce the powers conferred upon them by the adoption of the Act of 1892, which enacts that the owners of all common stairs or passages, private courts, or "lands" shall provide in future for their adequate lighting by gas.

At a meeting of the Town Council of Ayr on Wednesday, expenditure to the amount of £1317 was authorized for the purpose of scraping the main water-supply pipe from Loch Finlas to the Knockjarder filters, by which it is expected to increase the capacity of the pipe by 500,000 gallons daily. The Surveyor reported that the only permanent way to provide for the increasing consumption of water was to duplicate the pipe from Finlas to Knockjarder, at a probable cost of £33,000.

Mr. C. P. Hogg, of Glasgow, has been appointed to advise on the new water supply for Aberdeen. The water question has now been under discussion for a long time. A Bill was promoted to take a supply from the River Avon: but it was rejected by the House of Lords. A section of the Town Council contend that an adequate supply can be got from the River Dee—the present source; and Mr. Hogg has been chosen to advise on the scheme.

By the casting vote of Provost Bogle at a meeting of the Falkirk and Larbert Water Trust on Wednesday, it was decided that the Trust should agree to the inclusion of the compulsory water area in the scheme for the extension of the Falkirk burgh boundaries which is being promoted for the purpose primarily of safeguarding the gas undertaking of the burgh, and that the Trust should be dissolved in order that the Falkirk Town Council might become the authority for carrying out the provisions of the Water Acts in the event of the burgh being extended.

A shooting competition took place recently at Cowdenbeath between the merchants of the town and the local Territorial Company; but the "Terriers" were too much for their opponents, and beat them by 26 points—the score being: Territorials, 440; merchants, 414. A silver spoon was given by the Territorials to the highest score among the merchants; and this was carried off by Mr. J. B. Scott, the Engineer and Manager of the Gas Company, with 91 points out of the 100. Mr. Scott is also a keen curler, and holds the "Points" medal of the local club; and on Loch Leven a few days ago his rink beat Kincardine Castle in the Perthshire *v.* Fifeshire bonspeil.

Lady Gas-Stove Inspectors for Oldham.—The Oldham Gas Committee have decided, on the recommendation of Mr. A. Andrew, the General Manager, to appoint two ladies, at salaries of from 25s. to 30s. a week, whose special duty it will be to inspect gas-stoves and give householders instruction as to their proper use. It is believed that the Department will gain materially by this departure, and that gas consumers will get much better results from the use of the stoves than hitherto. The Department find there are careless people who allow the stoves to become rusty by non-usage, or only occasional use. It is hoped by the Committee to prevent a good deal of this in the future, and also to lengthen the life of the stoves by reason of proper treatment on the part of the hirers.

Municipal Gas and Electricity Committees.—At a meeting of the Oldham Corporation Electricity Committee, the Chairman (Mr. C. Hardman) referred to a circular issued by the Gas Committee drawing attention to the advantages possessed by gas. He said he thought that the circular revealed a kind of jealousy on the part of someone at the apparent success of the Electricity Committee. Architects, builders, and property owners were advised in the circular that a house would be more valuable if gas was installed. They might, however, be left to form their own conclusions. Exception seemed to be taken to the fact that the Electricity Committee had a canvasser who devoted half his time to the work of trying to induce people to use electricity instead of gas. This canvasser had been employed for six years; and it was strange that the Gas Committee had just found it out. In the area of supply, there were 91 registered plumbers—all canvassers for the use of gas. The Electricity Committee had one canvasser; and there were perhaps a dozen wiring contractors in the town. The ratepayers might be left to choose freely between the two.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Feb.* 17.

In the early part of the week, the buying was of a somewhat desultory character, and prices had a drooping tendency; but during the past day or two, there has been rather more demand, and values have quite regained any small loss they sustained. No doubt the serious outlook in the colliery world has had the effect of bringing into the market those who had near requirements to cover. The quotations at the close are £14 8s. 9d. per ton f.o.b. Hull, £14 10s. per ton f.o.b. Liverpool, and £14 12s. 6d. per ton f.o.b. Leith. For future delivery there is still a dearth of orders; buyers generally preferring to await developments before committing themselves. The figures now demanded by makers are £14 12s. 9d. per ton over the next few months, and £14 5s. per ton for the second half of the year, f.o.b. good ports; but no business has transpired thereat.

Nitrate of Soda.

The market is without change in either tone or value, and quotations are repeated at 10s. 4½d. and 10s. 6d. per cwt. for ordinary and refined qualities respectively, on spot.

LONDON, *Feb.* 19.

Tar Products.

The markets for tar products continue firm. Pitch is in fair demand, and the market is very strong at the moment. Benzols are quiet, and transactions are difficult to negotiate. Naphthas maintain their price. There is a fairly good inquiry for creosote, both for prompt and forward delivery. It is difficult to do business in crude carbolic acid, owing to the crystal makers withdrawing from purchasing; and, on the other hand, distillers are not willing to take lower prices.

The average values during the week were: **Tar**, 24s. 6d. to 28s. 6d. *ex* works. **Pitch, London**, 46s. to 47s.; **east coast**, 45s. 6d. to 46s. 6d.; **west coast, Clyde** 45s. to 45s. 6d., **Manchester** 44s. 6d. to 45s., **Liverpool** 45s. to 46s. **Benzol**, 90 per cent., naked, London, 10⅛d. to 11d.; North, 10d.; 50-90 per cent., naked, London, 10d.; North, 9½d. **Toluol**, naked, London, 10d. to 10½d.; North, 9½d. to 10d. **Crude naphtha**, in bulk, London, 4½d. to 5d.; North, 3⅞d. to 4½d. **Solvent naphtha**, naked, London, 11d. to 11½d. f.o.b.; North, 10d. to 10¼d. f.o.b. **Heavy naphtha**, naked, London, 11d. to 1s. f.o.b.; North, 10d. to 10¼d. f.o.b. **Creosote**, in bulk, London, 2⅝d. to 3⅛d.; North, 2¼d. to 2⅝d., salty; 2⅝d. to 2⅞d., liquid. **Heavy oils**, in bulk, 3¼d. to 3⅜d. **Carbolic acid**, casks included, 60 per cent., east and west coast, 2s. 10d. to 3s. **Naphthalene**, £4 10s. to £10; salts, 40s. to 45s., bags included. **Anthracene**, "A" quality, 1½d. to 2d. per unit, packages included and delivered.

A slight error was made in the price for east coast pitch last week; this should have been 45s. 6d. to 46s. 6d.

Sulphate of Ammonia.

The market continues firm, though there has not been so much inquiry for this season's delivery. Actual Beckton is still quoted £14 1s. 3d. to £14 2s. 6d. Outside London makes are £13 15s. to £13 17s. 6d.; Hull, £14 7s. 6d. to £14 8s. 9d.; Liverpool, £14 10s.: Leith, £14 10s. to £14 12s. 6d.; Middlesbrough, £14 8s. 9d. to £14 10s.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade in the north-east is now to some extent disorganized, as coalowners have very little fuel for sale to the end of this month, and beyond that the cloud is dense. In consequence, prices for small available quantities are higher, and for best Northumbrian steam coals from 14s. to 15s. per ton f.o.b. is quoted; while second-class steams are 13s. per ton. Steam smalls are scarce at 10s. per ton f.o.b. Production is full, but is well taken up; and the collieries have stocked some fuel for their own needs. In the gas coal trade, prices are firm for any quantities that are available beyond contracts—about 15s. per ton f.o.b. being quoted for best Durhams, and 13s. 6d. to 14s. for second qualities. "Wear specials" are very firm, and may be quoted as nominally about 15s. 6d. per ton f.o.b. As far as is known, gas companies have laid in fair stocks; but they will add to them a little in the next week. There are naturally few forward sales of gas coals under these circumstances; and it is probable that it will be a little time before any are made. Coke is firm. Gas coke has been selling at higher prices of late—good makes being about 15s. 6d. to 16s. 6d. per ton f.o.b. in the Tyne or Wear.

Scotch Coal Trade.

Handing-in of notices by a considerable body of Scottish miners has had the tendency to unsettle the market. Colliery owners are now laying down stocks of fuel, and are otherwise preparing for a strike. Prices are on the up-grade; and the expectation is that by the end of the week the rises all round will be continued. Prices, f.o.b. Glasgow, may be quoted: Steam, 13s. to 14s. 6d. per ton; splint, 14s. to 15s.; ell, 13s. to 14s.; trebles, 13s. to 14s. 6d.; doubles, 12s. 6d. to 13s. 6d.; singles, 11s. 6d. to 12s. 6d. Leith prices, f.o.b., may be given as approximately: Best screened steam, 14s.; washed trebles, 13s. to 14s. 6d.; washed doubles, 12s. 6d.; washed singles, 10s. 6d. to 11s. 6d.; and rough dross, 10s. Prices for Fife cannot be given with accuracy, in view of the handing-in of notices by the men.

While a number of Corporation workmen were engaged in repairing a leak in a water-main in Vauxhall Road, Liverpool, an escape of gas was discovered. Subsequently there was an explosion; and two of the men were badly burnt about the face and hands.

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Improved Street Lighting in Lambeth.

The Lambeth Borough Council decided, at their meeting last Thursday, to accept an offer made by the Gaslight and Coke Company to alter the present No. 2 burners fitted to the lamps to the "Nico" inverted incandescent system (2½ feet burners). In the letter from Mr. F. W. Goodenough, the Controller of the Sales Department of the Company, addressed to the Council, it was stated that careful tests show that the lamps with inverted burners give an effective light of from 70 to 80 candle power; whereas those fitted with upright No. 2 burners give a light of only 40 to 50 candle power—the average being nearer the first figure. As the inverted burners consume fully 2½ cubic feet per hour, the Company would be unable to make any reduction in their annual charges; but they would be prepared to substitute the inverted for the upright burners at a charge of 9s. per lamp, which could be spread over a period of three years, by increasing the charge per lamp from £2 4s. 4d. to £2 7s. 4d. In the district lighted by the Company, there are 602 lamps with No. 2 upright burners, of which seven are lighted day and night. The total cost of converting to the "Nico" inverted system would be £270 18s. 9d. The terms offered by the Company were unanimously accepted.

Theft of Gas.—A fine of £5 and costs on each of two informations was inflicted at the Liverpool City Police Court on Maria de Fernandez, who was charged with fraudulently using gas without it being registered by the meter. Suspicion being aroused, an inspector of the Gas Company visited the premises, and found that the service-pipe had been disconnected from the meter, and joined to the house-piping with flexible tubing. It was estimated that about £5 worth of gas had been fraudulently abstracted. A witness said the fraud had probably been going on for twelve months; but during this period the meter had registered a small consumption of gas each quarter—which no doubt was done to throw the officials off the scent. Since the issue of the summons, defendant had gone to join her husband in Spain; but she had written that if the Company would let her know the damages, she would send the amount.

Gas and Electricity at Carmarthen.—The report which was adopted at the annual meeting of the Carmarthen Gas Company stated that the quantity of gas sold during the past year was 23,579,000 cubic feet, as against 25,289,000 cubic feet in 1910—a decrease of 1,710,000 cubic feet, which was mainly due to the loss of public lighting. On the recommendation of the Directors, dividends of 7½ per cent. per annum on the ordinary shares and 7 per cent. per annum on the new ordinary shares of 1875 and 1886 were declared for the year. As from July, 1910, the Corporation of Carmarthen ceased to take gas for public lighting, having entered into a contract for fourteen years for electric lighting. In view of this fact, the Directors were pleased to find the quantity of gas sold to private consumers had been well maintained, and that the accounts justified the full dividend being paid.

Southport and the Question of Vertical Retorts.—When the minutes of the Gas Committee came before the last monthly meeting of the Southport Town Council, Alderman Foggitt referred to the following: "Resolved that the Gas Engineer, in consultation with the Chairman and Vice-Chairman, be instructed to report to the Committee as to the continuous systems of vertical retorts, and as to the system best suited for adoption at Crowlands; and that his report be printed and circulated among the members of the Committee." He asked how far the minute bound the Council. If it did bind the Council, he would have to oppose it. Mr. Trounson replied that it did not bind the Council in any degree. It was just an instruction to the Engineer to prepare a report. Mr. Snow said this was a matter in which the members of the Council took a great interest; and he asked that a copy of the report should be supplied to each member of the Council. Mr. Trounson said there would be no difficulty about this; and the minutes were agreed to.

Newport Gas-Works Benefit Society.—The thirty-seventh annual dinner of this Society was held on Monday last week—Alderman Thomas Canning, the Engineer and Manager of the Gas Company, presiding. After the loyal and other toasts had been honoured, Alderman Parry submitted "Success to the Newport (Mon.) Gas-Works Benefit Society." He said Alderman Canning had been working hard for the society for 37 years. He must have worked hard, and been aided exceedingly well by Mr. Whitefield (the Secretary) to bring about the results shown. The Society had set an excellent example by contributing £43 4s. to the Newport Hospital; and they had paid out in funeral and sick benefits no less than £132 12s. 10d. The Society had been splendidly supported by the Directors of the Company. Mr. Whitefield, in responding to the toast, said that in 37 years they had turned over nearly £8000. A vote of thanks was accorded to the Chairman and to Mr. T. H. Hazell, the Secretary of the Company, by whom it was acknowledged.

Artesian Water Supplies in Australia.—Writing on this subject recently, the Sydney Correspondent of "The Times" said: "Apart from the water in sight, there is a growing appreciation of the extent and value of the underground reserves. There are several minor underground water basins in Australia, one in Western Australia, and another partly in Victoria and partly in South Australia; but these are eclipsed entirely by the great central artesian basin, possibly the largest yet discovered. Its area is calculated at 569,000 square miles. It underlies more than half of Queensland, and considerable areas in New South Wales and South Australia, and includes a strip of the Northern Territory. There are now some 2500 bores in the Commonwealth, with a daily flow approximating upwards of 700 million gallons. A bore in Queensland, in what is probably the centre of the basin, has gone to a depth of 5045 feet; but on the edge artesian water has in a number of instances been struck a few hundred feet down. In Queensland, one well gives a flow of 4½ million gallons daily. The getting of this water is cheap. The Clifton bore in New South Wales is 1638 feet deep, and gives 1½ million gallons of water daily, at a cost of £3477."

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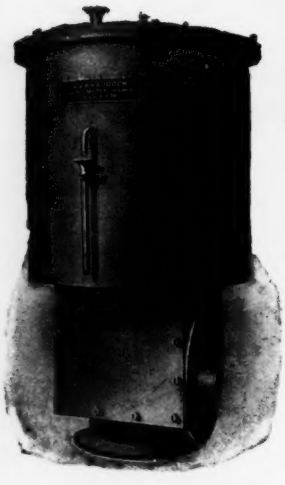

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Poll on the Rival Bawtry Bills.

The two Bills which are being promoted for the supply of gas and water to Bawtry—a charming old-world coaching town on the Great North Road, midway between Retford and Doncaster—have excited much local feeling, and resulted in a poll of the inhabitants being demanded; and it was taken on the 12th inst. Particulars of both Bills have already been given in the "JOURNAL." They were submitted to parish meetings, with the result that the Bawtry and Tickhill Gas and Water Bill was most favoured, and it was adopted; the Doncaster Rural District Council also being asked to support it. Then came the demand for the poll. This likewise has resulted in favour of the Bill named, for which 123 persons voted. For the Bawtry Gas Bill only 55 votes were recorded; giving a majority of 68 for the other scheme. Altogether, 178 voted out of a possible 210. The Bills are being promoted owing to the bright future believed to be in store for Bawtry as a result of the colliery developments which are taking place in the surrounding district.

London County Council and Meter Inspectors' Remuneration.—The Public Control Committee of the London County Council report that they have had under consideration the question of fixing a revised scale of pay for future chief inspectors of gas-meters. At present, the salary of officers of this grade commences at £200 a year and rises by £10 annually to £250. After ten years' satisfactory service, the salary is further increased by annual increments of £12 10s. to £300. There are four officers of the grade in question, each of whom is in charge of one of the Council's gas-meter testing-stations. The work carried out at two of these stations is lighter than that performed at the other two; and taking this into consideration, the Committee have decided to retain the maximum salary of £300 a year in the case of the chief inspectors at the two larger stations, but to fix at £250 the maximum salary for similar officers of the two smaller stations.

A Brighton Gas Fatality.—A constable, when walking through Islingword Street, Brighton, during the afternoon of last Thursday week, noticed a strong smell of gas, and in the course of investigating the matter, entered No. 76, where he found, lying on a bed, Edward Plank and his wife. The man, who was about 24 years of age, and had only been married a few weeks, worked on the railway at night, and so went to bed during the day. The constable at once flung open the windows and doors; and he and a neighbour carried Mrs. Plank into another room. Having given the neighbour hurried directions as to what to do to restore animation, he tried artificial respiration on the husband, who was clearly in the more urgent need. Other assistance soon arrived, and the sufferers were conveyed to the hospital, where Plank died the next morning. At the opening of the inquest, it was stated that the service-pipe to the house from the main was fractured at a point 6 feet or more from the pavement, as though some heavy weight had been over it. The pipe was 18 inches from the surface; and except for the fracture, it seemed to be in good condition.

Dewsbury Gas-Works Extensions.

On behalf of the Local Government Board, Mr. R. G. Hetherington and Mr. R. C. Maxwell last Thursday held an inquiry at Dewsbury, with reference to the application of the Town Council for a Provisional Order authorizing them to take trade effluents into the public sewers and charge the traders with the cost of the treatment. The application also included a request for permission to borrow £60,000 for extension of the gas-works. As to the latter, the Town Clerk (Mr. H. Ellis) said the provisions asked for were now commonly allowed by Parliament. Under the Dewsbury and Batley Corporations Gas Act of 1873, the Corporation were empowered to borrow £230,000 for the gas undertaking. The whole of this money was spent long ago; and further works were now urgently needed. Mr. G. W. Fligg (the Gas Engineer) stated that, in order to cope with the increasing consumption of gas, an additional holder was greatly needed. This would cost about £20,000. They also required other plant, meters, mains, &c., which would bring the total prospective outlay to £50,000. The Town Clerk explained that it was not proposed to spend all the money at once, but as it was needed. Mr. Watts objected to a proposal that power should be given to the Corporation to correct meters which had apparently got out of order, and to go back to the previous quarter in doing so. The Town Clerk said that this clause might operate to the advantage of the consumer, if the meter had been registering too much. Another point of objection raised by Mr. Watts had reference to meters and fittings in houses being subject to distraint.

Walsall Gas Undertaking.—In moving the adoption of the annual balance-sheet of the gas undertaking, the Mayor (Mr. J. Venables) informed the members of the Walsall Town Council that this showed a net profit of £8762, as against £8296 the previous year. He said it had been an anxious year owing to the railway strike and the enhanced price of coal; but, in spite of these circumstances, the balance-sheet was the best ever presented by the Committee. There had also been concessions to consumers to the extent of £1155. In reply to Alderman Pearman Smith, the Town Clerk said the gross profit was equal to 10 per cent. on the capital invested. It was decided to defer the report to the next meeting of the Council.

Colonial Gas Association, Limited.—The shareholders in the Association have received from the Secretary (Mr. A. J. Kingdon) particulars of an issue at par of 1708 ordinary shares of £5. The money is required to provide for expenditure on additional works and mains that are rendered necessary by the increasing demand for gas, and for the general purposes of the Company. The dividend paid for the last completed year on the ordinary shares was 6 per cent. The new issue will rank *pari passu* with the existing shares, except that they will not participate in the dividend which may be declared in respect of the six months ending Dec. 31, 1911. They will, however, rank for dividend calculated upon the instalments paid as due.

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Worksop Water Company's Winding-Up.

Last Friday, a meeting of the Worksop Water Company was held—under the presidency of Mr. W. Allen—to wind-up the affairs of the undertaking, which has been purchased by the Urban District Council. The Accountant (Mr. W. G. Hawson) submitted the report and statement of accounts of the winding-up. The Company were awarded £64,612; and the stocks and stores on hand at the date of transfer (June 23 last) were valued at £915. In September the Directors paid a first instalment on account, equal to twenty times the maximum dividend payable to each shareholder on the class of shares or stock held. The total amount divisible among the shareholders, and allocated according to the maximum dividends payable, is equal to the following sums: On the 1200 £10 10 per cent. maximum shares, £26 16s. 8d. per share; on the 600 £10 7 per cent. shares, £18 15s. 8d. per share; on the £5000 4½ per cent. preference stock, £120 15s. per £100; and on the 2200 4½ per cent. capitalized revenue stock, £120 15s. per £100. In addition to this, the 1200 10 per cent. maximum ordinary shares are entitled to the undistributed balance of revenue of £2100 on account of back-dividends, which is equal to £1 15s. per share. The net result of the winding-up is equal to 26 5-6 years' purchase of the maximum dividends. The proceeds, therefore, if re-invested in securities yielding £3 14s. 6d. per cent. on the amount invested, will produce the same income as that derived from the maximum dividends payable by the undertaking. The adoption of the report and dividend was unanimously agreed to. The Chairman remarked that the Directors had decided to forego any special remuneration. They had done their best in the interest of the shareholders. He paid a warm tribute to the efficiency of the Manager (Mr. George Heaps).

Reduction in Price at Cardigan.—Addressing the shareholders at the annual meeting of the Cardigan Gas Company, the Chairman (Mr. A. Clougher) said the Directors had carefully considered the question of the price of gas, and had decided to reduce the charge all round to 4s. per 1000 cubic feet, instead of 4s. 7d. to private consumers and 4s. 2d. for gas-engines, stoves, &c., with the usual discount to large consumers. The reduction will operate from the end of the current quarter. A 10 per cent. dividend was declared at the meeting.

Stealing Coal from a Gas-Works.—John Walters, a collier, was sentenced at the Nottingham Guildhall to two months' imprisonment for stealing 5 cwt. of coal from the London Road Gas-Works. After taking the coal trom a truck on the gas-works sidings, he shot it down into the cellar of John Lynch, a marine-store dealer. Next he asked Lynch what he would give him for it; but the latter did not want to have anything to do with the transaction. However, he gave Walters 1s. to get rid of him; but on the following day the prisoner went again, and demanded 5s. for the coal. Lynch then detained the man pending the arrival of the police.

A Defective Gas-Tap.—In the course of an inquiry into the death of a sailor named M'Carthy at Cardiff, John Gorwill, the proprietor of a refreshment house, said the deceased lodged with him; and on going into his bedroom he found him lying unconscious, with the place full of gas, and the tap turned partly on. He found that the tap would turn right round. The Coroner remarked that this explained the matter. The tap was not in order; and the deceased must have inadvertently turned it on. He advised Gorwill to ascertain periodically that the brackets in the bedrooms were in order.

Sheffield Public Lighting.—Alluding in the Sheffield City Council to a report of the Watch Committee regarding the substitution of electric lighting for public gas-lamps, Alderman Bennett said he thought, even as a matter of courtesy, that the Electric Light Committee might have been asked if they had anything to say before the subject was brought before the Council. He moved that the matter be referred back, so as to give the Committee an opportunity of discussing it. The Electric Light Committee's suggestion was that they should light certain streets suitable for trying the thing as an experiment. Sir William Clegg said he saw no objection to the amendment; but as the Gas Company had always treated the Corporation in an exceedingly fair spirit, they should have an opportunity of coming before the Watch Committee, so that there might be no preferential treatment. The amendment was accepted.

Land for the Dawlish Water-Works.—An inquiry was held at Dawlish last week by Mr. P. M. Crosthwaite, M.Inst.C.E., with reference to an application made by the Urban District Council to the Local Government Board for authority to put in force the power of the Lands Clauses Acts in regard to the acquisition of land for the purposes of water supply. Mr. F. S. Cole, the Clerk to the Council, said the owner of the land which constituted the source of the town's water supply proposed to sell it; and the Council, who wished to keep the supply free from risk of pollution, and also to make provision for a possible extension of the storage, applied to the owner to state a price. On their side, the Council had the land valued, and when they obtained from the owner the figure at which he was willing to sell, they found that it was about twelve times greater than they were advised the land was worth; while conditions were attached which it was impossible to entertain. The Surveyor (Mr. S. F. C. Churchward) and the Medical Officer of Health (Dr. H. B. Mapleton) gave evidence with reference to the water supply, and the desirability of the Council acquiring the land, which is chiefly moorland and plantation. Mr. H. D. Samuels, who appeared for Sir R. Newman, the owner of the land, said that, subject to proper safeguard, his client did not oppose the application. It was, however, vital to his interests that the present supply of water to his residence and the village of Mamhead should be maintained. He also wanted it laid down that the land should not be used for any other purpose than that of a water undertaking. The Clerk remarked that during the negotiations the Council gave way on these points.

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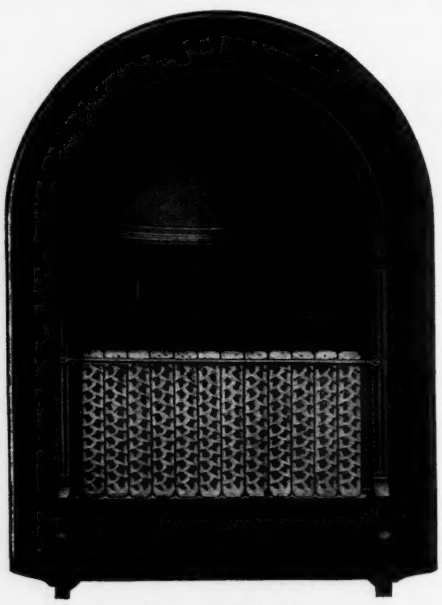

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Charges of Stealing Money from Prepayment Meters.

At the Old Street Police Court, last Thursday, William James Church and Henry Wilson were charged on remand with being concerned together in stealing the sum of 6s. 1d., the moneys of the Gaslight and Coke Company, from a prepayment meter at No. 6, Mansford Street, Bethnal Green; Wilson being further charged, on his own confession, with stealing sums of 2s. 4d. and 9s. 2d., the property of the Commercial Gas Company, from prepayment meters fixed in St. Mary Street and Wellclose Square. Mr. Humphreys appeared for the first-named Company, and Mr. Margetts represented the other. Evidence of the robbery from the Gaslight and Coke Company having been given at the previous hearing, Mr. Margetts said his clients had reason to believe that Wilson was responsible for the greater part of the large number of robberies from prepayment gas-meters which had been perpetrated during the past three years. He was, in fact, known as the "Gas-Meter King." In all these cases, as in the present ones, a man had called on the Company's customers who used these meters, and had gained access to the meter. As he always had on a uniform cap similar to those worn by the Company's servants, this was generally an easy matter. Having made a cursory examination, he would either go out to "borrow some tools," or to "send another workman in who would see to the meter at once, and so save the consumer a large quantity of gas." In either case, he would quickly return, and, under the pretence of getting the consumer to try the gas in some room the farthest from the meter, would break off the cash-box, and leave the house at the earliest opportunity. The audacity of the man carried him so far that, finding one consumer could neither read nor write, he tore off a strip of newspaper, which he handed to her, and in another case gave a plain slip of paper, and directed both women to enclose the strip in an envelope, and forward it to the Company, if she should find anything wrong with the meter. Evidence identifying Wilson as the man who had "inspected" and then robbed the meters at St. Mary Street and Wellclose Square having been given, he protested against the statement that he had robbed hundreds of meters. Mr. Margetts replied that he had with him a list of more than a hundred. Inspector Haigh said both prisoners had made statements to him, which they had signed; and they were both committed for trial.

Exmouth Water-Works.—The erection of the new pumping-station in connection with the Exmouth water undertaking is approaching completion. Tests have been carried out with regard to the consumption of fuel under varying conditions; and the pipe-line has also been tested. In about a month, the final test which is to be made before the works are handed over to the Council by the Contractors will begin. This will consist of pumping for ten consecutive hours each day, for a period of four weeks, 37,200 gallons of water per hour, and raising it to the reservoir at Squabmoor. The pumps, which are in duplicate, are each capable of raising 18,600 gallons per hour. There are 4½ miles of rising main.

Woking Gas Bill.—The Woking Urban District Council have decided to oppose the Bill for incorporating and conferring further powers upon the Woking District Gas Company. Mr. Shipton said he had the assurance of four Members of Parliament that the Bill would be opposed most strenuously unless the Council's demands were acceded to, and the Company gave an undertaking that they would pay a living wage to the men who were employed on the works.

End of the Elbeuf Municipal Gas Supply.—Readers may possibly remember the sad circumstances attending the failure of the scheme of municipal gas supply at Elbeuf, a cloth-manufacturing town on the left bank of the Seine, about 14 miles to the south-west of Rouen. The financial results were so disastrous that the Mayor (M. Mouchel), who was a strong supporter of the municipal control of the gas undertaking, committed suicide in a fit of depression. The Municipal Council then reviewed the situation; and, after a long discussion, they recently decided to free themselves of the incubus of the gas-works. They have accordingly handed them and the electricity undertaking over to a Belgian Company on a concession for forty years. Gas will be supplied at 5s. per 1000 cubic feet for lighting, 4s. 1d. for heating and culinary purposes, and 3s. 5d. for motive power, with free installation of rising pipes and branches, lighting and heating appliances in workmen's dwellings (without rent), and maintenance of public lamps, to be fitted with 3·5 cubic feet in place of 2 cubic feet gas-burners. On the occasion above referred to, one of the councillors remarked that the failure of the municipal gas scheme was not to be regretted over-much. The Council had started to municipalize everything; and the stern reality of things had stopped them at their very first attempt.

Barnstaple Water Company.—Presiding at the half-yearly meeting of the Barnstaple Water Company yesterday week, Mr. C. E. R. Chanter said that the position of the Company was eminently satisfactory. The income in the six months ended Dec. 31 showed a substantial increase of £495 as compared with the corresponding half of 1910, and out of the balance of £2490 on the revenue account the Directors recommended the payment of a dividend of 10s. per share on the "A" shares, with an addition of 1s. on account of arrears of dividend, and 7s. per share on the "B" shares. The supply of Instow had been working satisfactorily for six months. Several branch mains and extensions had been laid; but though these were additions to the original scheme, the total cost of £5200 was less than the estimate. New houses were being built at Instow, and the water supply was a boon to the place. The Directors had accepted with regret the resignation of the Secretary (Mr. C. W. Parkin), who was going abroad. He had served the Company with the highest efficiency for thirteen years. The report was adopted, and the dividends recommended were declared. Mr. Parkin thanked the Chairman for his references to the service he had rendered to the Company, and the Directors for the substantial gift they had made to him. It was announced that Mr. C. N. Wood, the Engineer, had been appointed Manager and Secretary to the Company, with Mr. F. Lile as Accountant.

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Brackley Gaslight and Coke Company, Limited.—This Company, formed about sixty years ago, and registered as an unlimited Company in 1885—has just been registered as a limited Company, with a capital of £3600, in 160 "A" shares of £12 10s. each, and a like number of "B" shares of £10 each, all paid up.

German Towns in Darkness.—According to a Central News telegram, the electric lighting station at Heinitz, providing power and light for the whole industrial district of the Upper Saar Valley and the Palatinate, has been destroyed by fire. The station was one of the largest on the Continent; and it is reported that hundreds of towns and villages will be without light, and some 20,000 working men will be thrown out of employment.

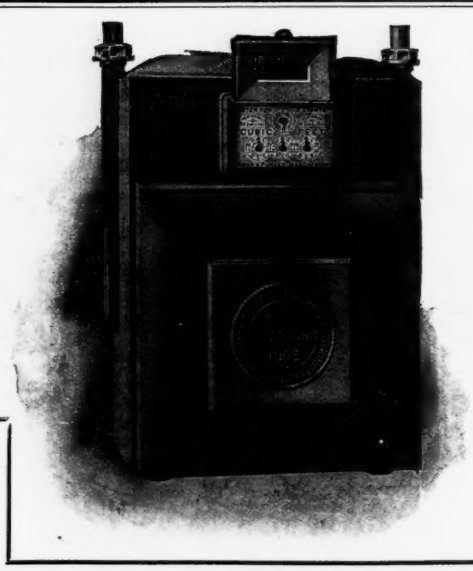
Barnstaple Gas Company.—Mr. C. E. R. Chanter presided at the annual general meeting of this Company last Saturday. The report of the Directors showed a balance of £4808, after paying an interim dividend of 5 per cent. on the "A" shares and 3½ per cent. on the "B" shares. It was proposed to declare balance dividends of like amounts, making 10 and 7 per cent. respectively for the year. The Chairman, in moving the adoption of the report and accounts, congratulated the shareholders upon the sound and progressive character of the Company's business. The serious trouble in the coal market had not affected their financial position. The year was a record one—the income being higher than on any previous occasion, and a better return being shown from gas and residual products. On the capital account £1400 had been spent on the extension of mains to Fremington, by which they had obtained a fair number of consumers. The report was adopted.

Topsham Water Supply.—A letter from the Secretary of the Topsham Water Company was read at the meeting of the St. Thomas Rural District Council last Friday, calling attention to what the Company consider as an unreasonable delay in coming to a decision with regard to the question of the water supply of Topsham. In the early part of last year, the Company were asked if they would sell their undertaking to the Council, and offered to do so at a valuation. Subsequently, at the request of the Council, the Directors named £2000 as the price they were willing to accept. On Dec. 22, the Council empowered a Commitee to negotiate with the Company; but more recently they had passed another resolution again delaying the matter, to enable the Topsham Parish Council to formulate a scheme in opposition to the Company. In the opinion of the latter, the Parish Council were simply desiring to delay matters. They had opposed the Company's wish to lay mains; and as the Company had been induced by the negotiations to abstain from applying for a Provisional Order, their operations had been suspended for nine months, to the serious loss of the shareholders. The letter further directed attention to the fact that the question of water supply is one for the District Council's decision; the Parish Council having no voice whatever in the matter. It was decided to inform the Company that the matter referred to should receive attention.

APPLICATIONS FOR LETTERS PATENT.

2886.—Watson, H. C., "Artificial light-reflecting system." Feb. 5.
2899.—Scott, J. W., and Beard, G. F. H., "Gasholders." Feb. 5.
2986.—Seal, C. M. S., "Keeping pipes or water from freezing." Feb. 6.
2992.—King, J., Jun., Burnett, J. R., and the Richmond Gas Stove and Meter Company, Limited, "Gaseous and liquid fuel burners or injectors." Feb. 6.
2997.—Wilkins, A. P., "Globe-carrier." Feb. 6.
3003.—Twigg, C. H., "Globe-holders." Feb. 6.
3036.—Perrier, A., "Manufacturing gas from benzol." Feb. 6.
3037.—Carpenter, C. C., "Superheater for use in conjunction with inverted incandescent burners." Feb. 6.
3041.—Ges. für Gasfeuerungs-Technik (Kerpely-Patente) G.m.b.H., "Furnace-charging apparatus." Feb. 6.
3043 —Knoevenagel, E., Reis, J., and Kuckuk, F., "Removal of carbon disulphide from gases." Feb. 6.
3053.—Sir W. G. Armstrong, Whitworth, and Co., Limited, Ridley, C.O., and Wright, R., "Discharging coal-trucks." Feb. 6.
3075.—Berry, J., Maylor, J. A., and Meters Limited, "Coin-freed prepayment mechanism." Feb. 7.
3112.—Anderson, D., "Gas-lamps." Feb. 7.
3113.—Lahaussois, R., "Generating rich gases." Feb. 7.
3138.—Beedle, W., Chopping, F., and How, J. G., "Taps." Feb. 7.
3139.—Büschel, C., "Lowering gas-lanterns." Feb. 7.
3142.—Crossley, H. and Hobbs, F., "Purifiers-grids." Feb. 7.
3159.—Johnson, W. & G., "Connection of branches to mains." Feb. 8.
3165.—Murray, D., and Gibb, G., "Water-meters." Feb. 8.
3190.—Sutherland, J. G. & A. G., and Ivers, D., "Dry gas. meters." Feb. 8.
3194.—Cleland, J., and Stewart, J. C., "Traps for gas-pipes." Feb. 8.
3224.—Ewart, J. W., "Water-heater valves." Feb. 8.
3234.—Fitchett, H. W., "Detection of gases." Feb. 8.
3254-5.—Blakeley, W., "Gasholders." Feb. 9.
3258.—Trezise, A. J., "Gas-kettle." Feb. 9.
3295.—Mills, C. K., "Acetylene generators." A communication from the White Light Company. Feb. 9.
3299.—Silberrad, O., "Production of nitration products from coal tar." Feb. 9.
3301.—Marks, E. C. R, "Acetylene generators." A communication from the firm of Albert Frank. Feb. 9.
3307.—Glover, T., and Williams, G. A., "Gas-regulators." Feb. 9.
3388.—Keith, J. & G., "Gas-lamps." Feb. 10.
3420.—Clerk, D., and the National Gas-Engine Company, Limited, "Internal-combustion engines." Feb. 10.
3423.—Ingram, J., "Connection of service-pipes to mains." Feb. 10.

DRY GAS METERS.



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MILES PLATTING, MANCHESTER.

RADFORD ROAD, NOTTINGHAM.

WIRES { "Sawer Manchester." "Sawer Nottingham."

TELEPHONE NOS. { 3289 (City) Manchester. 2025 (Central) Nottingham.

Agent for Scotland: JNO. D. GIBSON, 2, Causeyside Street, PAISLEY.

A fire which broke out underneath the organ in Christ Church, Salford, was said to have been caused by the fusing of an electric wire, which melted the main and ignited the gas. Fortunately, the outbreak was not of a serious character; the fire brigade being able to subdue the flames before any great damage was done.

In consequence of the recent floods in Spain, the City of Seville was reported by the correspondent of the "Daily Telegraph" to have been plunged in darkness. This has been denied by the Manager of the gas-works there (Mr. Walter Baily), who says the supply of gas was maintained without the slightest alteration.

TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Feb. 17. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.	
					Liverpool.	Manchester.
Tar, crude	per ton	—	24/- 28/-	24/6 28/6	—	24/- 27/6
Pitch	"	46/-	46/6	46/3	—	—
Benzol, 90%	per gallon	1/-	-/11¾	1/-	1/-	-/11½
Benzol, 50-90%	"	—	-/11	-/11	-/11	-/10½
Toluol, 90%	"	—	-/11	-/11	—	—
Crude naphtha, 30%	"	—	-/5	-/4½	-/5	-/4⅞
Light oil, 50%	"	—	-/4¾	—	-/4¾	-/4⅝
Solvent naphtha, 90-160	"	—	-/11	-/10½	—	-/10¼
Heavy naphtha, 90-190	"	—	-/11	-/11	—	-/11
Creosote in bulk	"	-/3¼	-/2⅝	-/2 9/16	-/2⅝	-/2⅝
Heavy oils	"	—	-/2⅝	-/2⅜	—	-/2⅞
Carbolic acid, 60's	"	—	2/11	2/10	2/10	2/9½
Naphthalene, crude drained salts	per ton	—	45/-	42/6	47/6	47/6 50/-
" pressed	"	—	60/-	63/-	60/-	60/- 75/-
" whizzed	"	—	—	—	70/- 72/6	65/- 75/-
Anthracene	per unit	-/2	-/1½	-/1½	-/1¼	-/1¼

GAS COMPANIES' STOCK AND SHARE LIST.

The week just closed on the Stock Exchange was almost the corollary of its predecessor. Business was very quiet, owing to the disturbing influence of hostile factors; and the fortnightly accounts settlement checked fresh enterprise. At times there were attempts at recovery; but they were not strong enough to last. The most disquieting element was the grim approach of the date for expiration of the colliers' notices without any visible prospect of arresting the final catastrophe. The opening day was dull and with no heart in it. Government issues did not give way. But Railways failed to obtain any support, and shrank in price; while Americans weakened. Tuesday brought an unlooked-for improvement. Gilt-edged were conspicuous in the van, and Consols rose ¾. Helped thus, perhaps, Rails had an appreciable rise; and Americans and Foreign followed suit. But Wednesday brought somewhat of a recoil; and realizations were the order. Government issues weakened, Consols fell ¼, and Rails were very shifty and uncertain. The pendulum was back again on Thursday for gilt-edged articles, and Consols recovered ⅜. But Rails were much depressed by the coal outlook; and Americans were unsteady. Friday was far from bright generally, and several weak spots were apparent. Consols fell ¼, Rails continued to droop, and Americans receded; but Foreign markets were strong. Saturday showed no pronounced fall; but the tendency was dull and apprehensive, especially in Rails. Consols closed at 78⅜-78⅞—a rise of ⅜ in the week. In the Money Market, there was a fair demand at firm rates, and discount was steady. Business in the Gas Market showed a considerable falling-off in point of volume—the quietest week for a long time past—and it was confined to a very limited number of undertakings. But the solid strength of the market remained unimpaired; and several quotations made further improvements in value. In Gaslight and Coke issues, the ordinary was very moderately dealt in, and realized from 107½ to 107⅝ *cum div.*, and from 104½ to 105¼ *ex div.* In the secured issues, the maximum made 85¾ and 86½ *cum div.*, and 84½ and 85 *ex div.*, the preference 103⅜ and 105 *cum div.*, and the debenture from 79 to 79¾. South Metropolitan was rather quiet at 116¾ to 117½ *cum div.*, and from 114 to 115¼ *ex div.* In Commercials, one bargain only at 111½ was marked in the 4 per cent. Among the Suburban and Provincial group, British changed hands at 45 special and 45½ (a rise of ½), Hastings 3½ per cent. at 95 and 96, South Suburban at 122 special and 124 *cum div.*, and Wandsworth at 146—a rise of 1. On the local Exchange, Liverpool "A" made 223 (a rise of 3), and ditto "B" 164. In the Continental companies, Imperial was done at 190 to 191, ditto debenture at 88½ and 89¼ *ex div.*, Union at 82⅜, ditto preference at 132½ to 133¾, and European at 20½ to 20⅝. Among the undertakings of the remoter world, Primitiva realized from 7 9/16 to 7 11/16, ditto preference from 5¼ to 5⅜, San Paulo 11½, and Malta 4 15/16.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.	Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.	£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 12	5	Alliance & Dublin Ord.	79—82	..	6 1 11	200,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	127—132	..	4 10 11
374,000	Stk.	Jan. 12	4	Do. 4 p.c. Deb.	91—93	..	4 6 0	561,000	Stk.	Aug. 16	10	Liverpool United A.	223—225	+3	4 8 11
250,000	5	Sept. 28	7	Bombay, Ltd.	6⅛—6⅝	+⅛	5 5 8	718,100	"	"	7	Do. B.	163—165	..	4 4 10
50,000	10	Aug. 31	15	Bourne-) 10 p.c.	29—30	..	5 0 0	306,083	"	Dec. 29	4	Do. Deb. Stk.	100—102	..	3 18 5
311,810	10	"	7	mouth Gas) B 7 p.c.	16⅛—16⅜	..	4 3 7	75,000	5	Dec. 14	6	Malta & Mediterranean	4¾—5	..	6 0 0
75,000	10	"	6	and Water) Pref. 6 p.c.	14⅛—14⅜	..	4 1 4	560,000	100	Oct. 2	5	Met. of) 5 p.c. Deb.	100—102	..	4 18 0
380,000	Stk.	Aug. 16	13	Brentford Consolidated	257—262	..	4 19 3	250,000	100	"	4½	Melbourne) 4½ p.c. Deb.	100—102	..	4 8 3
330,000	"	"	10	Do. New	198—203	..	4 18 6	541,920	20	Nov. 10	3½	Monte Video, Ltd.	12—12½	..	5 12 0
50,000	"	"	5	Do. 5 p.c. Pref.	120—122	..	4 2 0	1,775,892	Stk.	Feb. 15	4½	Newc'tle&G'tesh'd Con.	100—102*	−¾	4 5 9
206,250	"	Dec. 14	4	Do. 4 p.c. Deb.	97—99	..	4 0 10	529,705	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	85—87	..	4 0 6
220,000	Stk.	Aug. 31	11	Brighton & Hove Orig.	219—224	+2	4 18 3	55,940	10	Aug. 31	7/7/0	North Middlesex 7 p.c.	14½—15½	..	4 14 10
246,320	"	"	8	Do. A Ord. Stk.	159—162	..	4 18 9	300,000	Stk.	Dec. 14	8	Oriental, Ltd.	137—139	..	5 15 1
490,000	20	Sept. 28	12½	British	45—46	+½	5 8 8	60,000	5	Sept. 28	8	Ottoman, Ltd.	7—7½	..	5 6 8
120,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb. Stk.	92—94	..	4 5 1	31,800	53	Aug. 16	13	Portsea Island A	140—145	..	4 14 10
109,000	"	Feb. 15	6	Bromley, A 5 p.c.	125—131*	..	4 11 7	60,000	50	"	13	Do. B	133—138	..	4 14 2
165,700	"	"	4½	Do. B 3½ p.c.	98—101*	..	4 9 1	100,000	50	"	12	Do. C	130—135	..	4 8 11
82,278	"	"	5½	Do. C 5 p.c.	117—120*	..	4 11 8	398,490	5	Oct. 12	8	Primitiva Ord.	7⅛—7⅜	..	5 3 3
55,000	"	Dec. 29	3½	Do. 3½ p.c. Deb.	80—82	..	4 5 4	796,980	5	Dec. 29	5	Do. 5 p.c. Pref.	5⅛—5⅜	..	4 13 0
250,000	Stk.	"	4	Buenos Ayres 4 p.c. Deb.	94—96	..	4 3 4	488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—	312,650	Stk.	Dec. 29	4	River Plate 4 p.c. Deb.	94—96	..	4 3 4
100,000	10	—	—	Do. 4½ p.c. Pref.	4¼—5½	..	—	250,000	5	Sept. 28	12	San Paulo, Ltd.	11—11½	..	5 4 4
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	76—80	..	5 12 6	115,000	10	"	6	Do. 6 p.c. Pref.	11½—12	..	5 0 0
157,150	Stk.	Feb. 15	5	Chester 5 p.c. Ord.	108½—110½*	..	4 10 6	125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	49—50	..	5 0 0
1,513,280	Stk.	Aug. 16	5/9/4	Commercial 4 p.c. Stk.	110—113	..	4 17 7	135,000	Stk.	Aug. 31	10	Sheffield A	240—242	..	4 2 8
560,000	"	"	5½	Do. 3½ p.c. do.	105—107	..	4 19 8	209,984	"	"	10	Do. B	239—241	..	4 3 0
475,000	"	Dec. 14	3	Do. 3 p.c. Deb. Stk.	75—77	..	3 17 11	523,500	"	"	10	Do. C	239—240	..	4 3 4
800,000	Stk.	"	4	Continental Union, Ltd.	82—85	..	4 14 2	90,000	10	Sept. 28	6	South African	8—9	..	6 13 4
200,000	"	"	7	Do. 7 p.c. Pref.	132—134	..	5 4 6	6,429,895	Stk.	Feb. 15	5/9/4	South Met., 4 p.c. Ord.	113½—115½*	+¼	4 14 8
492,270	Stk.	"	5½	Derby Con. Stk.	122—124	..	4 8 9	1,895,445	"	Jan. 12	3	Do. 3 p.c. Deb.	78—80	..	3 15 0
55,000	"	—	4	Do. Deb. Stk.	104—105	..	3 16 2	209,820	Stk.	Aug. 16	8½	South Shields Con. Stk.	159—161	..	5 5 7
840,150	10	Jan. 31	10	European, Ltd.	20½—21½	..	4 14 1	605,000	Stk.	Feb. 15	5/16/8	S'th Suburb'n Ord. 5 p.c.	121—123*	+⅝	4 14 9
16,160,600	Stk.	Feb. 15	4/14/8	Gas-) 4 p.c. Ord.	104—105*	..	4 10 2	60,000	"	"	5	Do. 5 p.c. Pref.	115—118*	+½	4 4 9
2,600,000	"	"	3½	light) 3½ p.c. max.	83½—85½*	..	4 1 10	117,058	"	Jan. 12	5	Do. 5 p.c. Deb. Stk.	119—121	..	4 2 8
4,062,235	"	"	4	and) 4 p.c. Con. Pref.	101—103*	..	3 17 8	502,310	Stk.	Nov. 10	5	Southampton Ord.	107—109	..	4 11 9
4,531,705	"	Dec. 14	3	Coke) 3 p.c. Con. Deb.	79—81	..	3 14 1	120,000	Stk.	Feb. 15	7⅛	Tottenham) A 5 p.c.	144—147*	+1½	4 17 0
258,740	Stk.	Sept. 14	5	Hastings & St. L. 3½ p.c.	95—97	..	5 3 1	483,940	"	"	5⅝	and) B 3½ p.c.	114—116*	+¾	4 17 0
82,500	"	"	6½	Do. do. 5 p.c.	—	..	—	149,470	"	Dec. 29	4	Edmonton) 4 p.c. Deb.	94—96	..	4 3 4
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	17—17½	..	6 5 9	182,380	10	"	5	Tuscan, Ltd.	8½—9	..	5 11 1
131,000	Stk.	Sept. 14	7½	Ilford A and C	155—158	..	4 14 11	149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	99—101	..	4 19 0
65,780	"	"	6	Do. B	126—129	..	4 13 0	236,476	Stk.	Aug. 16	5	Tynemouth, 5 p.c. max.	114—116	..	4 6 2
65,500	"	"	4	Do. 4 p.c. Deb.	92—94	..	4 5 1	255,636	Stk.	Aug. 31	6⅞	Wands-) B 3½ p.c.	144—147	+1	4 13 6
4,940,000	Stk.	Dec. 29	4	Imperial Continental	190—192	..	4 13 9	85,766	"	Dec. 29	3	worth) 3 p.c. Deb. Stk.	71½—73½	..	4 1 8
1,235,000	Stk.	Nov. 10	9												
		Feb. 15	3½												

Prices marked * are "Ex. div."

Owing to the bursting of a steam-pipe, two men were recently severely scalded, and the municipal electricity supply of Yarmouth failed.

According to a special communication to the "Financial News," the German Continental Gas Company of Dessau are making arrangements to raise a loan of 4,000,000 marks.

The Matlock and District Gas Company's mains are being extended so as to supply Chatsworth House, also Beeley and Stanton, by means of a supply obtained in bulk from Rowsley, where a new holder is to be erected.

At the London Sessions last Friday, Francis George Hutchings, aged 25, of Relinque Road, Lower Sydenham, was, after a prolonged hearing, acquitted on a charge of stealing 13s. from a prepayment gas-meter at an unoccupied shop in the Sydenham Road.

A grocer's shop in Boutport Street, Barnstaple, was destroyed by fire last Friday. The inmates (Mr. and Mrs. Evans and a child) escaped with difficulty; having to be rescued from an upper window by means of a ladder. The cause of the fire, which started in a store-room, is believed to be the fusing of an electric wire.

Last Tuesday, London was visited in the afternoon by darkness which necessitated an earlier resort to the ever-ready gas-burner than was expected in the morning. Referring next day to the event, which the "Daily Telegraph" said rendered London a "city of cheerful night," a writer in that paper made the following remarks: "A visitation of this kind is endurable, even if it has its effect on the next quarter's gas bill. It was accepted yesterday with the more patience because those who have given any attention to the statistics of the subject have an uneasy consciousness that, on the average, we still owe Fate for this winter a whole three weeks of real fog—the fog which chokes and blinds, and wraps traffic and streets in an impenetrable, all-pervading shroud of darkness. . . . During the past decade, the drainage of the Thames Valley, better economy of fuel, and the greatly extended use of gas-fires, has noticeably lessened the number of more objectionable incidents of the kind. This year we have not had a single case, and yesterday's midnight gloom, disconcerting and unexpected as it was, might undoubtedly have been much worse. Half a generation ago, with the wind and barometer as they were, London would probably have been engulfed for many hours in an oblivion bringing all industries to a standstill, and causing the profoundest discomfort to everyone within its baleful sphere of influence."

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

ENGINEER AND MANAGER. Brecon Gas-Works.
DRAUGHTSMAN. No. 5526.
DRAUGHTSMAN. No. 5527.
CANVASSERS, &c. No. 5525.

Appointments, &c., Wanted.

CHEMICAL PLUMBER, &c. No. 5492.
MANAGER OR SUPERINTENDENT. No. 5518.
CANADIAN BUSINESS CO-OPERATION. No. 5528.
COMMERCIAL MAN (WITH INVESTMENT IF DESIRED). No. 5529.

Concessions (Water and Electricity), &c., in Holland.

"WATER AND LIGHT," Technische Boekhandel, Waltman, Delft.

Plant, &c. (Second-Hand), for Sale.

GAS-VALVES. Teignmouth Gas-Works.
WASHER-SCRUBBER. Sutton-in-Ashfield Gas-Works.

Patent for Sale.

GAS-BURNER. E. Knipprath, 9, Fore Street Avenue, E.C.

Meetings.

BRENTFORD GAS COMPANY. St. Ermin's Hotel, Westminster. Feb. 23. 2.30 o'clock.
MITCHAM AND WIMBLEDON GAS COMPANY. Gas Offices. Feb. 27. Three o'clock.

TENDERS FOR

Cookers, &c.

PONTYPRIDD GAS DEPARTMENT. Tenders by Feb. 21.

Fire-Clay Goods, &c.

PONTYPRIDD GAS DEPARTMENT. Tenders by Feb. 21.
RHONDDA URBAN DISTRICT COUNCIL. Tenders by Feb. 28.

General Stores (Iron and Steel, Shovels, Gas, Water, and Gun Metal Fittings, Oils, Paints, Ironmongery, Lead and Compo. Pipes, &c., Lime, Sulphuric Acid)

BRIGHOUSE GAS DEPARTMENT. Tenders by March 6.
PONTYPRIDD GAS DEPARTMENT. Tenders by Feb. 21.
RHONDDA URBAN DISTRICT COUNCIL. Tenders by Feb. 28.

Governor, &c.

LLANDUDNO URBAN DISTRICT COUNCIL. Tenders by March 2.

Lighting Appliances (Mantles, Burners, Lamps, Slot Fittings, &c.).

PONTYPRIDD GAS DEPARTMENT. Tenders by Feb. 21.

Mantle Ash.

LONDON COUNTY COUNCIL. Tenders by March 6.

Meters, &c.

BRIGHOUSE GAS DEPARTMENT. Tenders by March 6.
LLANDUDNO URBAN DISTRICT COUNCIL (Station Meter). Tenders by March 2.
PONTYPRIDD GAS DEPARTMENT. Tenders by Feb. 21.
RHONDDA URBAN DISTRICT COUNCIL. Tenders by Feb. 28.

Oxide of Iron.

MANCHESTER GAS DEPARTMENT. Tenders by March 7.
RHONDDA URBAN DISTRICT COUNCIL. Tenders by Feb. 28.

Pipes, &c.

BRIGHOUSE GAS DEPARTMENT. Tenders by March 6.
PONTYPRIDD GAS DEPARTMENT. Tenders by Feb. 21.
RHONDDA URBAN DISTRICT COUNCIL. Tenders by Feb. 28.

Retort Installation, Vertical, &c.

BARNOLDSWICK GAS DEPARTMENT. Tenders by March 1.

Tar and Liquor.

CARLISLE GAS DEPARTMENT. Tenders by Feb. 28.
HAWORTH URBAN DISTRICT COUNCIL. Tenders by Feb. 26.
PONTYPRIDD GAS DEPARTMENT. Tenders by Feb. 21.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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